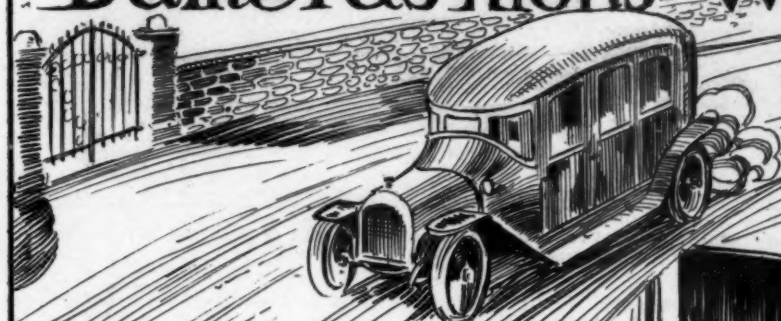


# THE AUTOMOBILE

## Dame Fashion's Whims for 1912

### Some Late Creations in Bodies and Fittings

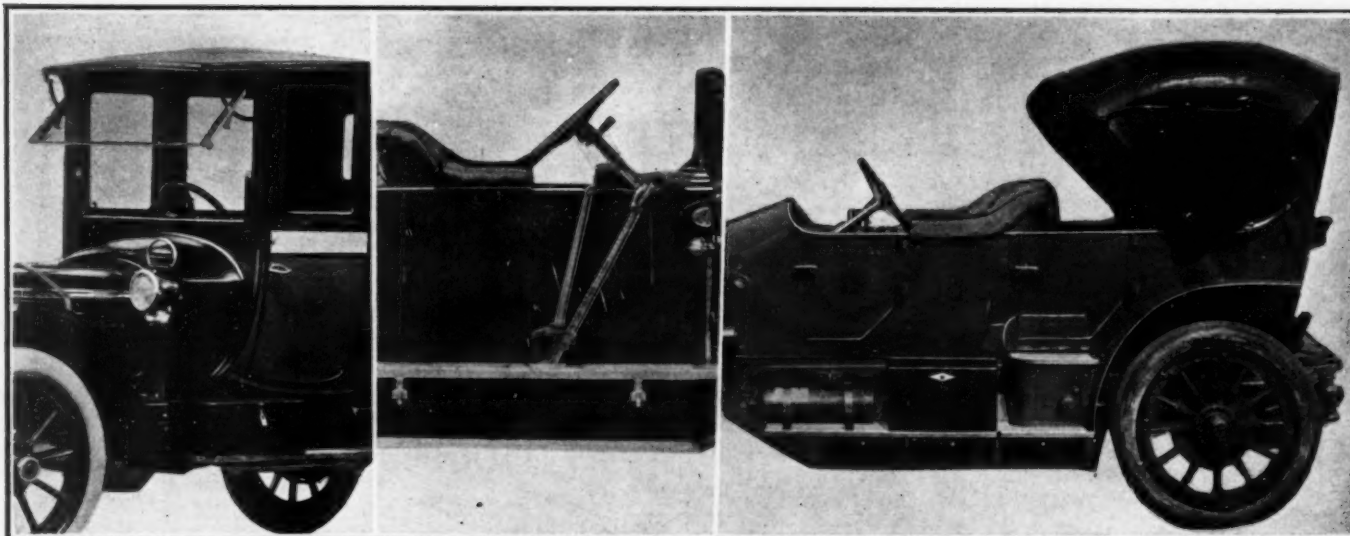


ASHION, the goddess worshipped by mortals from time immemorial, has asserted her sway over the automobile more positively than ever this year. Body-makers and designers have thought and studied over the problem of making bodies luxuriously comfortable and at the same time beautiful in line and elegant in finish. They have taken the psychological element into consideration in realizing that every purchaser of an automobile, whether a touring car or a

limousine, wants something that is exclusive if he can get it without too much expense. They have had to accommodate the shapes and dimensions of the bodies which they produce to the chassis, and generally to the bonnets, of the cars for which the bodies are made.

But it is the demand of fashion that brings about the greatest and most radical changes in bodies, fenders and bonnets, which might be called the clothes of the automobile, just as the same whimsical demand alters at will the cut and form of the clothes of men and women. Perhaps the bodymakers give the fashion a hint now and then, as the tailors are more or less justly suspected of doing, but the fact remains that it is the taste of the purchasing public which ultimately decides the features to be retained and those to be discarded. The changes which the shape and form of bodies have undergone in the past decade illustrate this very clearly. We remember the clumsy affairs, short, dumpy, heavy, poorly upholstered and with doors in the rear, which were dignified by the name of automobile bodies about 1900. Then came the side-door body with many improvements in the way of shape, fittings, size and weight over the doubtful imitations of the European bodymaker. For a number of years the members of the trade contented themselves with minor changes, many of them of an experimental character. Then the foredoor body seized on popular favor and has held it so strongly that the open-front touring body is now a distinctive mark of the car built before the advent of the 1911 automobile season. Not a single open-front body of the touring or limousine type was to be seen at either of the recent New York automobile shows. The only cars shown which continued the use of the open-front style were light runabouts having high-seat runabout bodies.





Driver's compartment on Packard Berline. Slanted foredoor ventilators and running-board tool-box on the Oldsmobile. Utilization of the running-board on the Simplex 90

This year the bodymakers seem to have begun to realize to the fullest extent the great variety of possibilities which the modern automobile body offers for the exercise of their art. The coming of the automobile was a regular godsend to the carriage-making and upholstery businesses, as the horse-drawn vehicles had settled into more or less conventional lines which offered few opportunities for variation. Now these trades have an almost unlimited field before them.

BODIES 1911

#### Wide Differences in Styles

The bodies on the 1911 market are of all sorts, sizes and conditions. There are open bodies, closed bodies, nearly-open bodies, nearly-closed bodies and half-open bodies. And all these bodies have a thousand varying qualities, yet all are designed and fitted up with the aim of attaining the greatest comfort possible combined with the most graceful, attractive lines. Nearly all of the bodymakers have, very sensibly, made comfort the foremost consideration, some of them hitting on very ingenious means for securing the most complete provision for this quality.

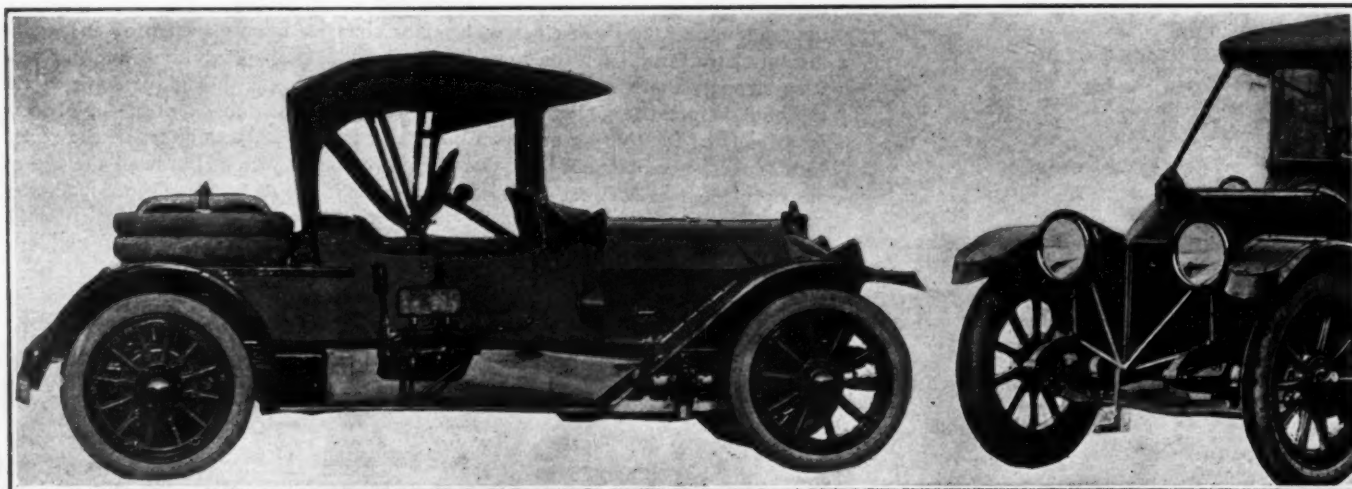
The Pierce-Arrow, Knox and one or two others have arched the doors of the limousines, landaulets and other closed cars, as is shown in the illustration on page 262, so that entrance and exit are made very easy and rendering unnecessary the uncomfortable crouching position in going in or out which the ordinary closed carriage or automobile door requires. Moreover, by this new method of construction the damage incurred to the millinery of the lady passengers is reduced to a minimum, if not entirely

avoided, for the high, wide form of door allows plenty of room for the large hats so dear to the hearts of the fair sex.

The cowled dash is almost, if not quite, as popular as the foredoor. More than half of the cars exhibited at the Madison Square Garden and Grand Central Palace shows were furnished with the cowled form of dash. Many variations were shown, however, scarcely two of them being alike in shape, depth, material, finish, and width. Some had very graceful symmetrical lines, while others were undeniably ugly. Metal was the favorite material, though there were many cars equipped with wood cowls and many more with types of wood combined with metal. There were even one or two fitted with cowls of stiff and soft leather. Some of the makers used a form of cowl with a wide face and took advantage of this to place in this face, right in front of the driver, the speedometer, clock, gauges and other instruments which formerly encumbered the dash. This type, as used on the Knox cowl-dash cars, is shown at the top of the sketch on page 264. The Thomas car is another which uses this idea.

#### Many Forms of Ventilators

The use of the foredoor and the cowled dash makes necessary some form of ventilation for the front compartment as without it the heat is very uncomfortable, especially in summer. Accordingly, practically all the cars on the 1911 market are equipped with ventilating devices of one form or another. On some cars, as in the case of the Oldsmobile, slanted vents have



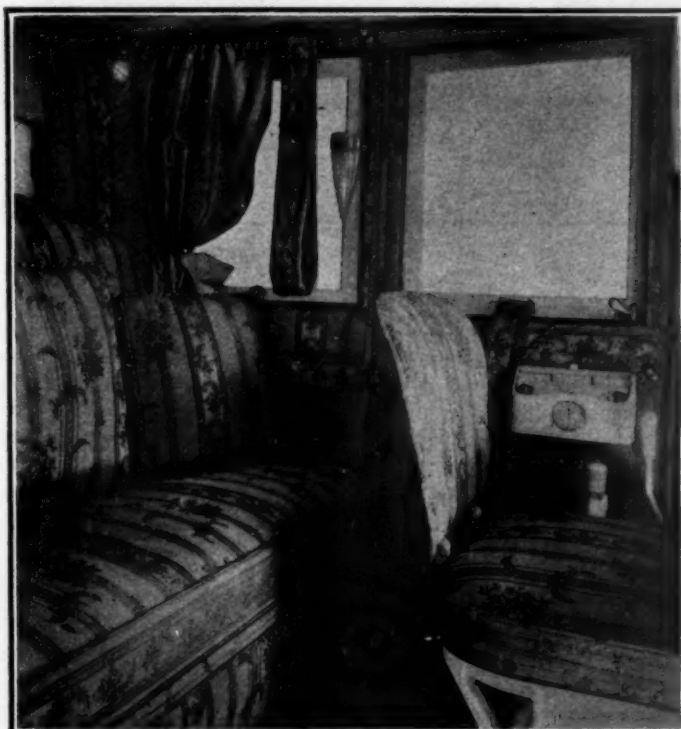
Two views of the Abbott-Detroit Submarine, showing leather cowl, V-shaped radiator and battleship construction



been cut in the foredoor and in the sides of the dash-cowl. On others fan-shaped ventilators, which may be adjusted to suit the weather by a simple turn, are placed in the dash, the cowl or the foredoors.

### Some Cars Have Hinged Foredoors

A great many cars have slot ventilators in the dash which are adjusted by moving a strip of metal up and down in a slot. Others have a hinged door, fitted with an adjusting thumbscrew, covering an opening in the top of the cowl. Screens are used in all these devices to keep out dust and dirt as much as possible. Some makers have been satisfied to hinge the foredoors at the back so that they open forward and to provide a strap of metal or leather for holding the door slightly open when ventilation is desired. Several companies are equipping their cars with removable foredoors so that they may be converted into the open-front type for summer use.



Interior of luxurious Waverley electric coupe



Another product of the upholsterer's art

Many purchasers of cars are having special bodies built to order, specifying the particular points, qualities and perhaps materials to be incorporated in the finished product. Many of the automobile companies are getting out cars of special design calculated to suit these people who prefer original designs. One of these special cars, which is a part of the company's regular line, is the new Abbott-Detroit submarine roadster which was shown at the Palace and two views of which are given on page 258. The V-shaped radiator is a distinct novelty on an American car, though the Metallurgique, a Belgian car, has used this form for some time. Everything about the Submarine is made to correspond, as much as possible, with the appearance and fittings of a warship. The gray sheet-metal body is fastened together with large rivets, producing an effect of great strength, and the clamps for holding tires in place, etc., are all of the same sort as the clamps used on a battleship. An auxiliary seat on either side, ingeniously arranged on the running-boards, gives the car a three- or four-passenger capacity when desired.

The Cole Motor Car Company, of Indianapolis, Ind., makes a metal-body torpedo runabout with an auxiliary seat on each running-board so placed that all four seats are in a row. The extra seats are of good height, being almost on a level with the regular seats, which are rather low. This roadster has a com-

partment in the rear inclosing tanks and tool space. Tires are carried strapped to the cover of the compartment.

Another special body, which appeals particularly to liverymen, as well as to people who desire an automobile of large carrying capacity without sacrificing comfort to seating accommodations, is the eight-passenger Schacht body depicted on page 260. This body is of unusual width in the middle, though it does not appear so on account of the care used to keep the proportion of the body intact. A large, comfortable seat is placed back-to-back fashion, behind the front seat, affording room for three passengers. Two front seats are provided, of course, and the usual three-passenger rear seat in the tonneau.

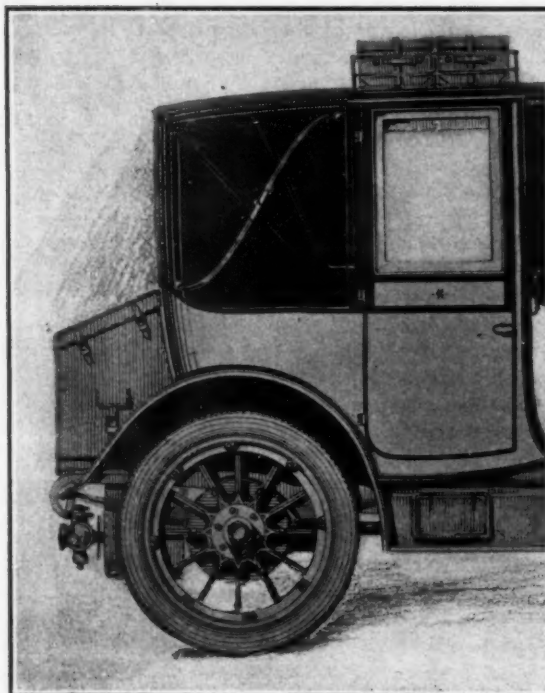
There were several cars fitted with bodies of the Sedan type exhibited at the New York shows. These bodies are sometimes called one-compartment bodies as they have no division between the driver's seat and the rear seat. They look very cosy and appear especially suited to the use of people who choose to drive

their own driving and yet like to have a closed car. The Premier Car de Lux and the Lozier one-compartment car were among the examples of this type. Almost all the electric vehicle makers showed cars with bodies of this sort as the electric has always been more of a one-compartment vehicle than the gasoline car. Plans of three of the variations of this form of body are shown on page 261. In two, it will be noticed, the seat next to that of the driver folds against the side of the car, one being on hinges, while the other is both collapsible and adjustable. In the third the bottom of this seat folds against the back and the whole seat revolves on a seat-pivot, not shown in the illustration.

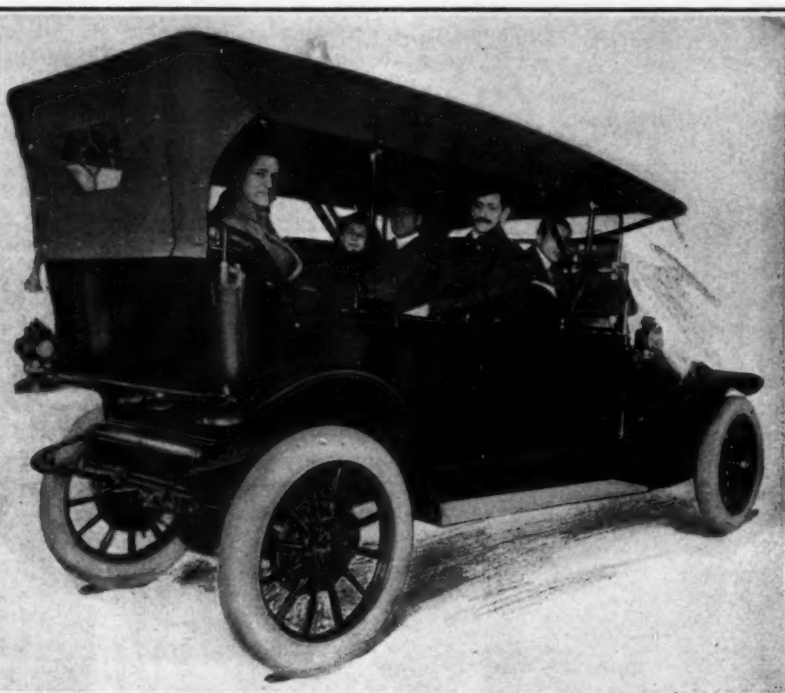
### Electric Broughams Popular

Among the electric cars the brougham has become a great favorite, despite the disadvantage of having one of the two double seats facing backward. The general effect of this type of car is very pleasing and many like it because of its cosiness and comfort.

The Springfield Metal Body Company, of Springfield, Mass., beside manufacturing all sorts of bodies to order, makes a specialty of a practical all-the-year convertible body with a folding top and full glass inclosure. This convertible body is not

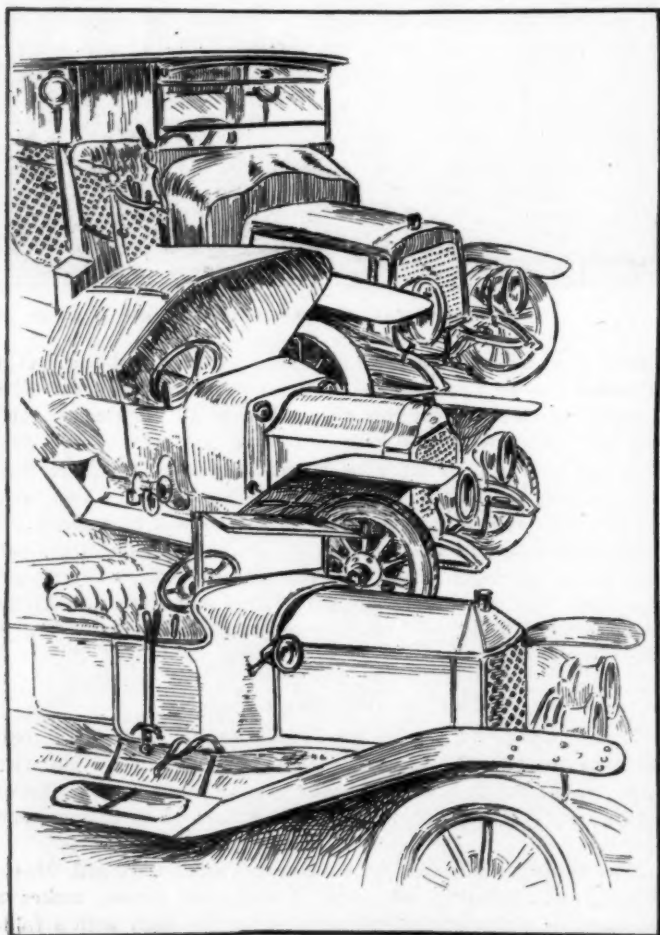


Baggage system of National landaulet



Eight-passenger Schacht touring car

much heavier than the ordinary foredoor touring body fitted with windshield and top, and may be completely closed in less time than an ordinary top can be raised and the side-curtains attached. When the car is arranged as an open car it looks just like an ordinary foredoor touring car and the top folds back



Some foreign cars—Panhard-Levassor, Pic-Pic, Holbrook

into the same position and the same amount of space as an ordinary bow top. Part of the glass windows are stowed away in a compartment in the back of the front seat and the rest slide down into the doors, as is shown in the illustration on page 262. When the top is up there are no bows extending across the doorways to impede entrance and exit and, instead of crawling under side-curtains, roomy doors, like those of a limousine, afford a clear passage. The glass front is suspended at the top and when swung in forms a ventilator for the front of the body. Noise and rattle have been guarded against by the avoidance of the use of door-flappers and hinged joints, which are subject to rapid wear, and by fastening all joints with adjustable screws. The roof being of the canopy type, the acoustic properties of the body when closed are excellent. The same sort of body is made in roadster and coupé forms.

#### Victoria Top Has a Following

The ordinary form of automobile top remains as popular as ever. Most of the rather striking colors, however, which used to be seen in top materials seem to have disappeared and the plain black top appears to have been found the most practical as well as the most refined in appearance. The use of canvas and similar materials for automobile tops seems to have died out, too, giving place to more durable and more sightly stuffs. The victoria top, adapted to automobile use from the carriage field, continues in favor, especially for pony-tonneau and close-coupled cars, though it is sometimes used on the ordinary touring car.

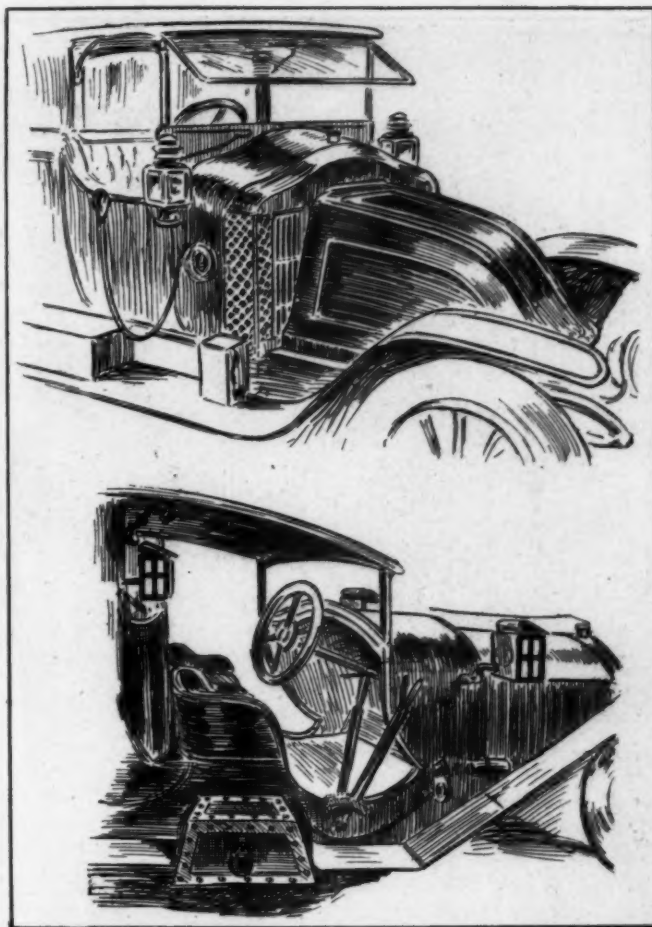
A glance at the foreign cars, shown on pages 260 and 261, serves to disclose the fact that, while the American bodies now in use have the same general characteristics, they are much more graceful in line than the imported cars and show much more taste in their general appointments. The European body-makers cannot compete with their American brothers, as the limited production possible gives them no opportunity to avail themselves of the elaborate tools and machinery which the Americans require for their large output. The foreign upholsterers, however, often do much better work than the Americans because of the greater amount of care and time spent on each piece of work. Still, our upholstery is improving each year and, unless the foreigners make a corresponding advance, it will not be long before the American product is better than the European.



The upholstery of the closed cars exhibited at the New York shows was a revelation. Materials of all sorts were used with very fine effects. There were closed cars upholstered in leather, broadcloth, brocade, silk, suède, wulfin, doeskin, whipcord, corduroy and other stuffs. The corduroy looked like a very sensible material as it makes a very fine appearance and at the same time is very durable. Some of these limousines, landaulets and sedans were veritable creations. Everything about them was perfect, and the luxury of their appointments almost Oriental.

#### Upholstery Very Luxurious

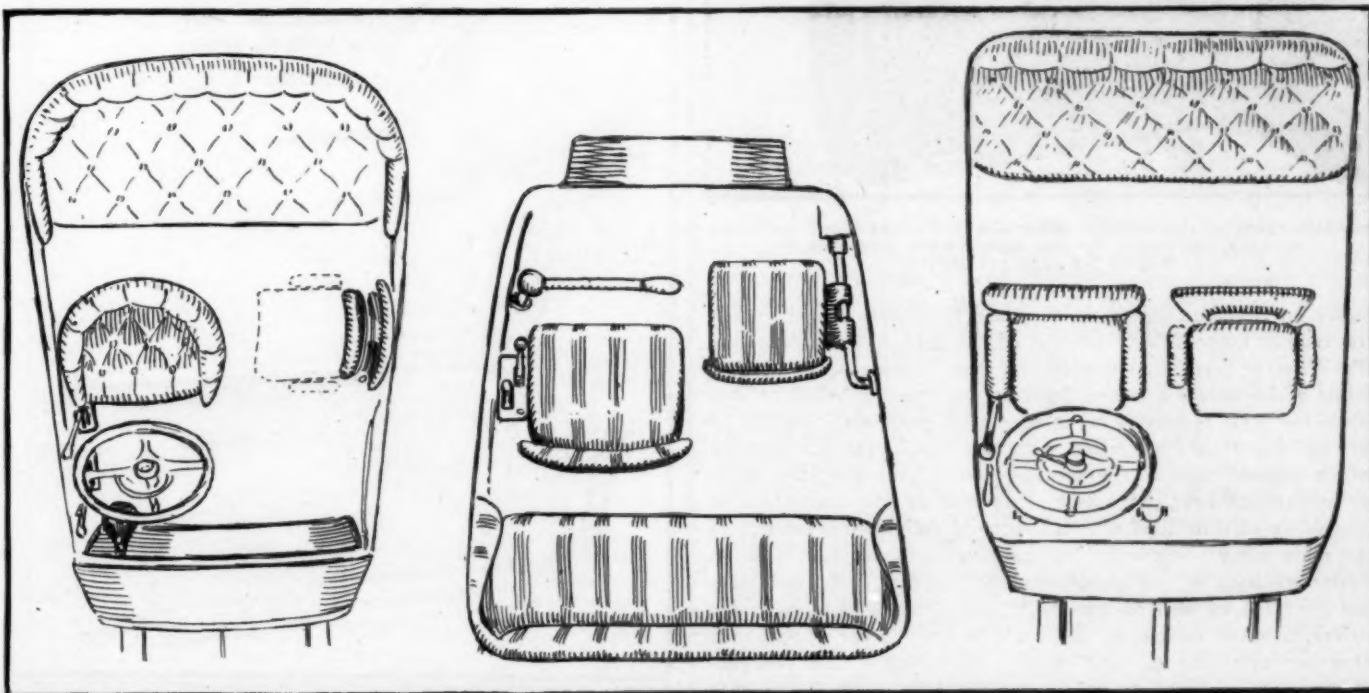
A good illustration of this is the Waverley electric, an interior view of which is shown on page 259. Many of the cars were upholstered in one of the cloth materials with a silk, satin or taffeta head—that is, the side walls and the ceilings were finished in those materials. The use of tapestry for borders and door-trimming is very popular and the number of varying patterns and effects which may be obtained with it is surprising. In most of the limousines and landaulets the front seat is finished in smooth leather, and in many the gearshift levers are in the center, with the steering wheel on the left so that the footman can step out on the right side. In one car at the Garden show, however, the seat beside the driver was upholstered in whipcord, the same as the interior of the car. This was to provide for the overcrowding of the rear seats. It seems hardly practical because the dust settling on the whipcord would soon render it much less desirable than leather. Most of the closed cars have been designed to be as dustproof as possible this year, every little opening having provision for keeping out dust. There is no danger of suffocation, however, as in most of the cars the windows drop out of sight into the sides of the body, making an almost-open tonneau. In some, as in the White, the window between the rear compartment and the driver's seat may be dropped out of the way into the back of the seat, making the car into a form of the one-compartment car. Several of the closed cars use sashless windows with various devices which the makers claim absolutely prevent rattle of any kind. Different methods have been employed to dispose of the folding seats in the closed cars when they are not wanted. In some they fold against the side walls. In others they fold against the back of the front seat and, in others, against the floor. Some makers, like the Chalmers company, take pains to have all the seats facing forward, but the majority are satisfied to leave the folding seats facing backward.



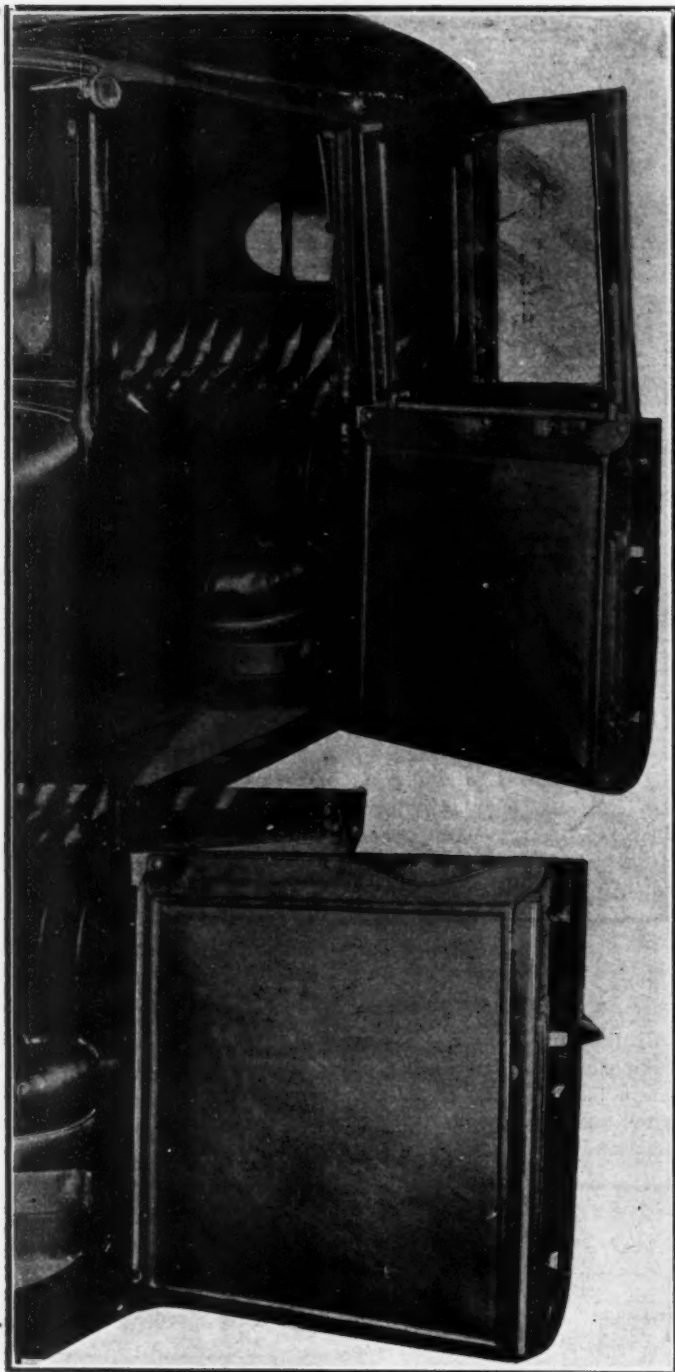
Two other foreign cars—Renault, Metallurgique

#### Fittings Remarkably Complete

In the way of fittings the modern closed car is apparently as complete as it can be without becoming a railroad train or an ocean liner. There is deep, soft upholstery on the seats and often auxiliary cushions are provided. There are padded arm-rests and padded arms on the folding seats. There are reading-



Plan views of three forms of coupé in which all seats face forward



Roadster type of Springfield collapsible body, showing door-glass in place for closed-car use and slipped into bottom of door for open-car service

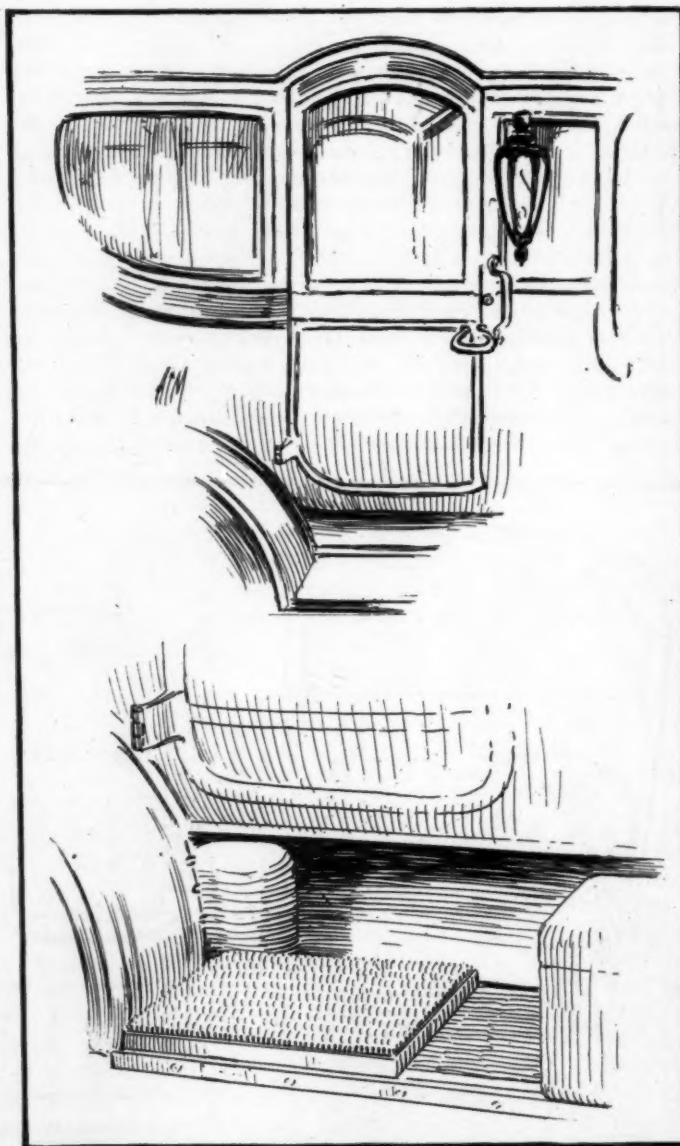
lights, or Pullman lights, as they are sometimes called, beside the regular dome lights. Several of the cars, like the Alco and the Waverley electric, are equipped with running-board or step lights which throw a strong light on the running-board or step when the door is opened, as is shown on page 263. Almost all of the closed cars are fitted with the usual vase for flowers, which appeals more to the average woman than the finest piece of mechanism ever put together, as well as the vanity-box of leather or pigskin filled with all sorts of delightful mysteries to the male mind. A number of these vanity-boxes are made in dustproof style to insure cleanliness. Heaters and ventilators are provided as well as hat-cords, cane-rings, telephone to the driver, in short, everything one could desire in a car of this sort. One car even has a cigar-lighter, and another, the Stevens-Duryea, has a clamp on the door-sash strap, doing away with the old-fashioned button. Of course, all are fitted with mirrors.

Many have gold-plated trimmings, and some have ivory lever-handles. The use of bone for door-pulls and cane-rings is noticeable in the higher-priced cars.

In the touring bodies, too, there are many new things. One of these is the painting of aluminum bodies to represent highly finished wood of various sorts. The Knox Automobile Company, of Springfield, Mass., exhibited a number of cars at the Madison Square Garden show, one of which was finished so like mahogany that no eye could discern the difference. The company exhibited another car painted to represent Circassian walnut, and still another representing bird's-eye maple. The Pope-Hartford, instead of having the foredoors and the interior of the driver's well upholstered in the usual way, has a paneled mahogany lining. This makes a very pleasing effect, the only trouble with it being that if it is not well cared for and cleaned now and then the finish will suffer. Many of the cars for 1912 have a leather facing on the back of the front seat. This gives a finished appearance to the tonneau of a car and at the same time does away with the polished back to the front seat which is so easy to mar or scratch.

#### Various Minor Refinements

One or two of the cars with pony tonneaus, like the Thomas car of that type shown at the Garden, have a cowl fitted to the back of the front seat as well as to the dash. This adds to the symmetry of the car's appearance, though it



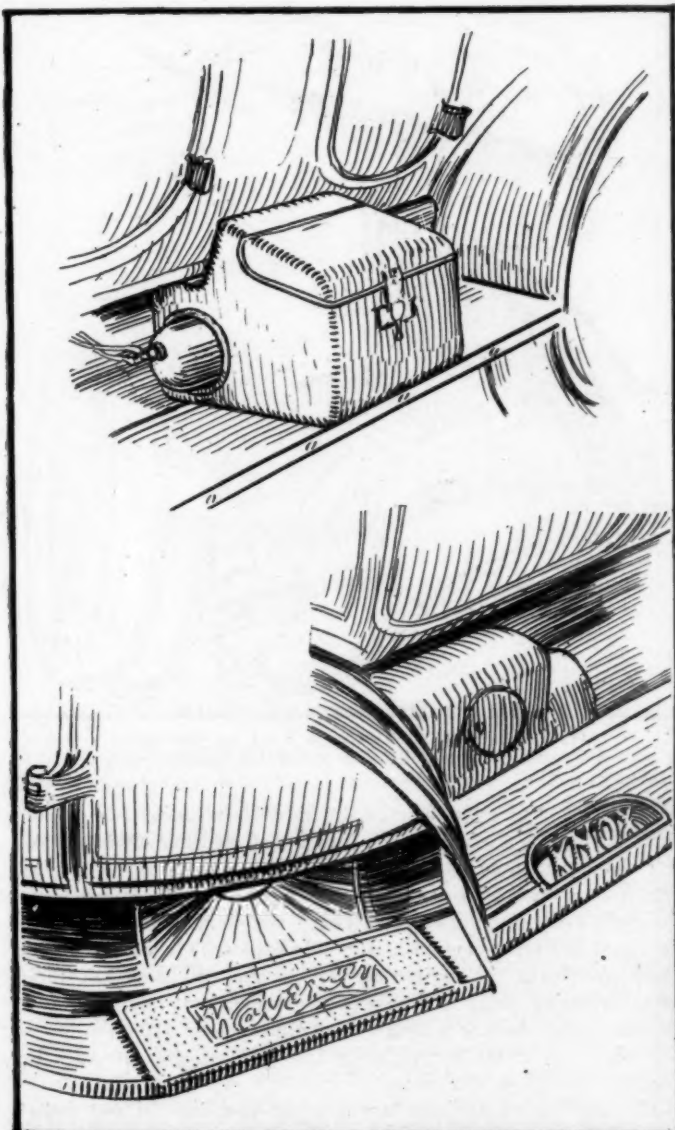
Arched door in Pierce-Arrow limousine and foot-mat on running-board used by several cars



does not seem to be especially useful as a protection from dust, rain or cold. The Knox company has a clever idea for securing such protection for the feet of the driver, aside from the protection afforded by the cowl. This is passing the stems of the pedals through strips of metal which slide in slots on the floorboard, thus preventing all currents of air from coming through. There are a few cars, like the Overland, which get away from the disadvantage of a comparatively short wheel-base by making the rear seat a little higher than the front seat, thus gaining space in the tonneau. The Stoddard-Dayton utilizes the same idea to provide ample knee-room behind the folding seats, though keeping the front seat at almost the same height to give plenty of room for the driver. The same ways of disposing of the folding seats are used in the touring cars as in the closed cars. The upholstery of the touring cars is almost always of leather on account of the conditions of weather to which it is so often exposed. There was a Packard car shown at the Garden and an Otto at the Palace, however, which were upholstered in cloth. Practically all of the makers are willing to furnish cloth upholstery if it is desired, though they do not recommend it as it stains too easily and collects dust too readily to be of much use in the open type of car.

#### Development in Torpedo Styles

The torpedo style of body seems to be more popular than ever this year. There is hardly a maker who does not include at



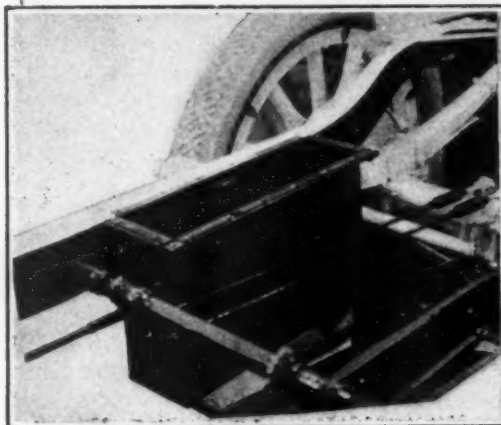
Tool-box and acetylene tank on Peerless. Waverley step light. Knox foot-scraper in running-board



Rear view of the Otto roadster, showing disposal of tires and baggage. Stoddard-Dayton roadster's provision for impedimenta

least one torpedo model in his line. Many of the bodies of this sort look very much like a boat, some of them having graceful, symmetrical lines and others looking like overgrown gravy-boats. When a torpedo has good lines it is "a thing of beauty" if not "a joy forever," but when it is poorly designed it is one of the clumsiest, most unhappy-looking things imaginable. Fortunately, most of the torpedo bodies now on the market are at least fairly well designed, while some of them are superb in their sweep of line and well-balanced proportions. The torpedo form appears to have taken the place of the pony tonneau and close-coupled bodies to a large extent, although both these types are still carried by the majority of makers. Most of the torpedoes are slim and low-hung with the top of the seats almost, and in many cases, exactly, on a level with the top of the bonnet, giving the passengers the sensation of skimming over the ground to a greater degree than in the ordinary touring car.

The torpedo roadster has taken a firm hold on popular favor and evidently intends to keep it for some time. This year has brought about a marked development of this type of car and the new features which have been introduced point to still further improvements. The compartments in the rear make a handy place to carry gas and oil tanks, and generally are sufficiently roomy to contain tools and baggage as well. The cover of the compart-



Position of battery-box on the Cole



Running-board compartments on Warren-Detroit

ment is very often arranged so that extra tires may be strapped upon it in such a way that it may be opened without removing them.

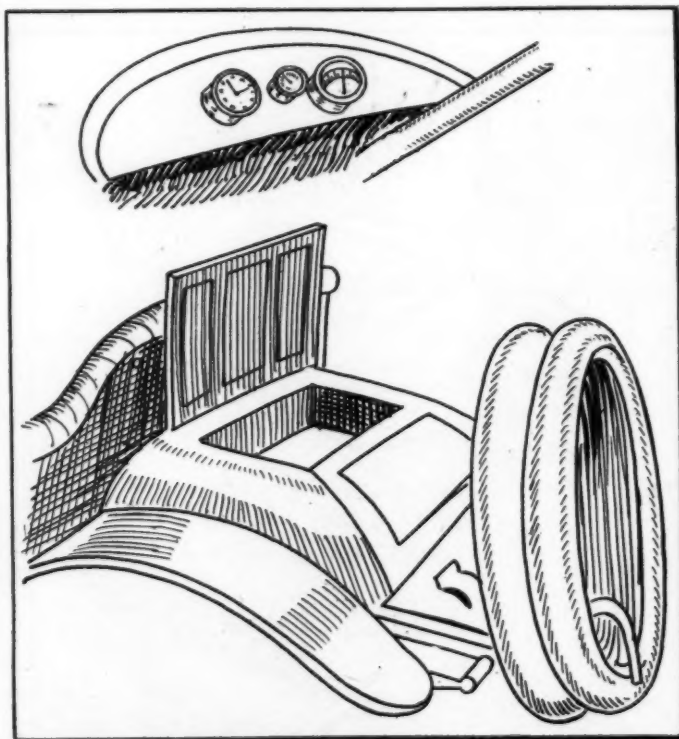
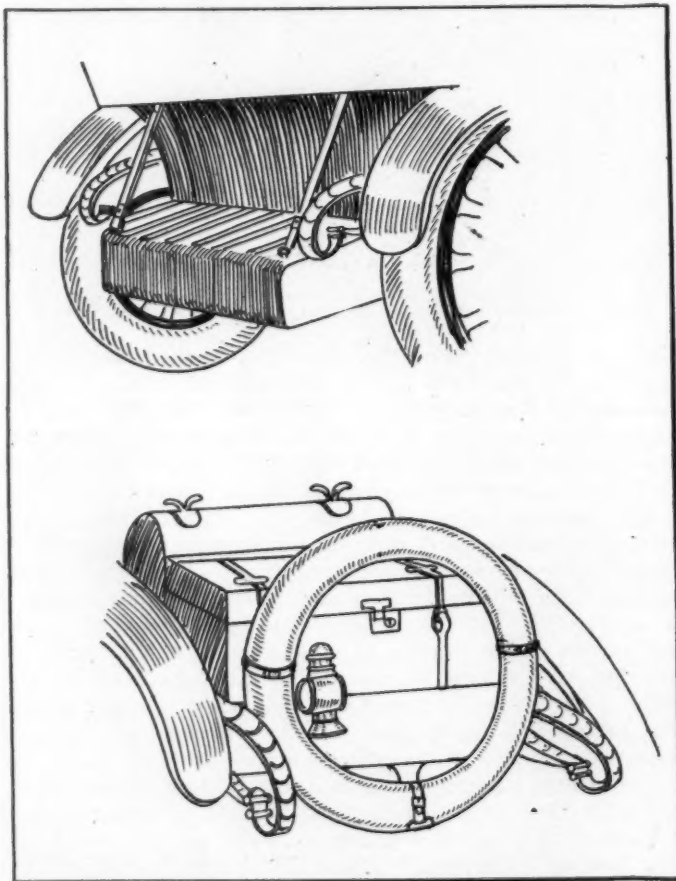
There has also been great improvement in the design and arrangement of the ordinary type of roadster. Most of those now on the market are laid out somewhat on the lines of the old-time speedster, with cowled dashes, low seats slanted back, lots of footroom and the tanks on the rear platform. They have been made very comfortable and their general appearance has been made more graceful and finished.

#### Record-Breakers Numerous

The speed car, as the semi-racer type has come to be called, is very popular, having a dashing look combined with all the characteristics of the cars which break the speed records. Practically all of them have open fronts with the two low-backed,

slanted seats almost on the floor, short gearshift levers and every superfluous weight eliminated. As in many of the cars, the driver's seat is slightly advanced. The advantage of this feature is that the driver is given free play for his elbows in manipulating the steering wheel and levers.

There seems to be a wide divergence in the preference of the different manufacturers this year in the matter of control. A

Instruments in face of dash-cowl on the Knox  
Compartment in rear of Mercer roadsterGasoline tank and baggage rack on Oldsmobile Autocrat  
Tire, tank and trunk on Maxwell Mercury

great many have gone over to the side of left-hand control absolutely, placing both gearshift levers and steering wheel on the left side in all their models. Others, more cautious, are trying out the left-hand idea in only a few cars of their lines, retaining the right control on the rest. There are some who hold confidently to the right control as the only logical type and there are some who leave the matter entirely to the purchasers of their cars, declaring their willingness to furnish any style desired. Besides these, there is a long list of makers who place the steering wheel on either the right or left side of the car and the gearshift levers in the center.

The Reo and King cars use a novel gearshift of the radial type. The lever, situated in the center of the car, works in an X-shaped slot, neutral being the central position. In the Reo,



the low-speed gear is engaged by moving the lever backward to the left. Intermediate is diagonally across to the front right and high is forward to the left. Reverse is backward to the right.

The use of the foredoor makes it necessary for the makers to decide between placing the control levers inside or outside of the body. The majority place them inside, though a large number have devised ingenious ways of bringing the levers up on the outside of the door without altering their positions. A few companies using inside levers do away with the objectionable feature of lack of space for the hand by extending the levers above or away from the foredoor. The general trend in the shape and size of control levers is toward the short, S-shaped type which requires very little exertion and practically no change of position on the part of the driver in changing from one speed to another or when applying the emergency brake.

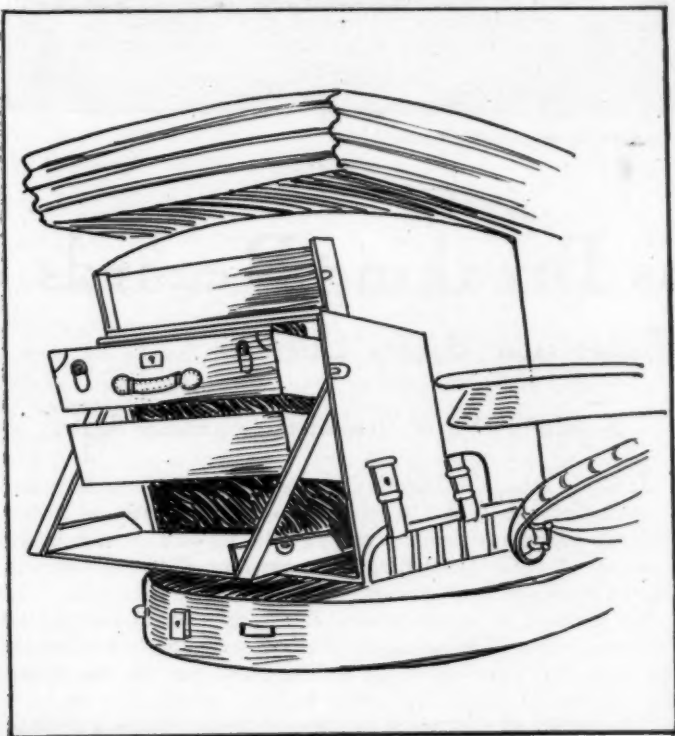
The general tendency in headlights this year is to make them large in diameter but small in thickness and to bring them close to the radiator, many car makers using a rod to connect and steady them. All sorts of experiments are being tried with the small lamps, some companies contenting themselves with making them smaller without changing their position or method of application, while others incorporate them in the dash in a bull's-eye effect, or, if the dash is cowl'd, insert them in the cowl in

others use the double-drop form. Each has its advantages.

There is a large variety in the systems of body suspension and in the shape of the rear springs in use at the present time. The front springs are almost all of the semi-elliptic type, although a few cars, like the Franklin, employ elliptic springs all around. The semi-elliptic style is as popular as ever for the rear construction, its application being varied by the different manufacturers. Some attach it to a platform spring at the rear while others fasten it to the frame member, generally by means of a shackle, though sometimes the belt attachment is used. A few makers extend the frame-member into a horizontal hook and shackle, the spring to the end, thus allowing the spring to clear the frame when compressed under shock. The three-quarter elliptic type of spring has acquired a considerable following as it has great resiliency and permits of giving the frame a larger drop than is possible with the other kinds of spring.

#### All Available Space Utilized

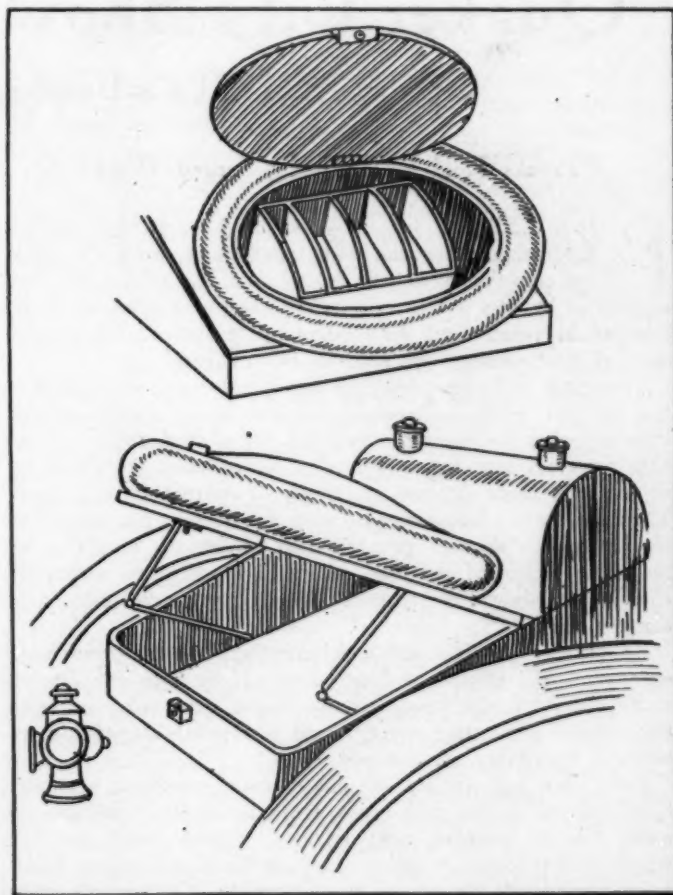
A number of ingenious schemes for the disposal of baggage, batteries, tools, acetylene tanks are shown in the accompanying illustrations. The special tire-trunk of the Knox, which is carried under the rear of the body, deserves mention as an example of these. A baggage-rack holding a large trunk full of suit-cases may be readily attached, fitting over the tire, as depicted in the sketch on page 265. Several of the companies are using the idea of inserting a foot-scraper in the running-board, depicted on page 263, as well as the foot-mat shown on page 262. The general tendency seems to be to get rid of the encumbrances which have hitherto disfigured the dash, running-board and the outside of the car generally. The results of several of the companies' efforts in this direction, combined with their endeavors to obviate the necessity for disturbing the passengers in case of tire or other trouble, are shown in the illustrations. The most important outcome of this tendency is the clean-cut, finished appearance which characterizes the 1912 car.



Knox tire-trunk, showing location of baggage rack

various ways. The tail-lights used are much smaller than formerly, though the only special ways of attaching them are those of the Packard company, which sets them into the left rear fender, and the Pierce, which uses a small electric light. Some of the lamps depend entirely on electric systems and others are designed for use with kerosene as well. Of course, the usual form of kerosene lamps is still used to a considerable extent for both dash and tail lights.

The manufacturers have paid a great deal of attention this year to the elements which determine the riding qualities of the car. Many of them have added shock-absorbers or auxiliary springs of one sort or another to their standard equipment. A number of them have changed the shape of the springs used in the rear, combining with this various innovations in drop-frame construction, some pinning their faith on the single-drop type while



Ingenious arrangement of rear compartments on Stevens-Duryea



View of the Third Regiment Armory Section of the Philadelphia Show

## Quaker City Show is Breaking Records

Philadelphia's Two-Building Exhibition Boosts Business

### Trucks Hold Forth During Second Week

**P**HILADELPHIA, Jan. 22—Part II of the eleventh annual automobile show was inaugurated today, when the pleasure cars that have been on dress parade for a week were supplanted by very nearly as comprehensive an exhibition of the commercial vehicle and the electric car, together with a hold-over of most of last week's accessories exhibits.

It was not to be expected that the attendance would approach that of last week, consequently there was no disappointment manifest when the opening crowd fell shy of that which stormed both armories last Saturday week. Incidentally, the character of the attendance differed materially from that of last week. The hard-headed business man, who was present not merely to see but to be "shown," predominated. With the exception of the First Regiment building, where eight different makes of electrics are shown, the absence of the feminine contingent was conspicuous.

Business and professional men wrestling with the problem of economical and efficient transportation will be especially catered to throughout this concluding week, special days being set aside and suitably designated for different businesses—manufacturers, brewers, merchants, storekeepers, etc.

Every size and variety of motor truck, runabout, roadster, light delivery wagon and heavy truck is shown, applicable to every line of business, ranging from a small Brush delivery wagon of 600 pounds capacity to a huge Knox fire engine, Mack 7-ton dump truck that can be dumped inside of 30 seconds without the driver leaving his seat, and two or three other huge trucks of even greater capacity.

### Scarcity of Room Necessitates Auxiliary Shows

It is the largest exploitation of the commercial vehicle Philadelphia has ever held. Never before has the number of makes and the variety of exhibits required the services of two buildings, which is more significant than anything else of the growth of the electrically and gasoline-propelled wagon.

As evidence of the endurance of the commercial vehicle, the Packard Motor Car Company has on view the cross-country Packard that left New York with a 3-ton load on July 8 and arrived in San Francisco August 24.

The display of electrics at the uptown armory forms a striking contrast to the mammoth trucks. Each occupies an equal amount of space. The exhibition of pleasure electrics and motor trucks comprises the following:

*First Regiment Armory:* Electric pleasure cars, Baker, Columbus, Detroit, Flanders, Hupp-Yeats, Rauch & Lang, Waverley and Woods. Commercial vehicles, Autocar, Brush, Cartercar, Commer, G. M. C., Gramm, Kelly, Mercury, Morgan, Peerless, Sandusky, Seitz and Speedwell.

*Third Regiment Armory:* Commercial vehicles—Chase, Walker, Waverley, Mais, Commercial, Sampson, Pierce-Arrow, Alco, Knox, Packard, Reo, Philadelphia, Ford, Lozier, Baker, Cameron, Mack, Saurer, Locomobile, White and Kisselkar. In addition the accessories display hold-over for this week.

### First Week a Huge Success

Part I of the 1912 show will go down in local automobile history as excelling all previous events. In point of attendance this exposition has far outclassed any of its predecessors. It is



the consensus of opinion among the dealers that an exceptionally large proportion of visitors the past week has been composed of buyers or else those that are considered good prospects; and that the amount of business transacted was greater than had ever before been accomplished during show week.

Exhibits that formed a feature of the Madison Square Garden show were shipped here upon the conclusion of the gasoline pleasure car part of that exhibition and usurped the places of exhibits temporarily installed for the opening Saturday night.

The experiment of opening the doors to the public 2 hours earlier than has been customary received its tryout on Monday and justified the wisdom of the move.

Following an established custom, Wednesday was designated as Society Day, more commonly referred to as Millionaires' Day. Hundreds of special invitations were issued to state and municipal authorities and government attachés stationed in Philadelphia. Double the prevailing admission fee was exacted on this day with the idea in mind of thinning the ranks of the many who are merely attracted by the glitter of that occasion. Whether any thinning out took place is a question. Certain it is that it was not noticeable, and in line with the first three days a new attendance record was set up.

But it remained for Thursday, Friday and Saturday for high-water marks from an attendance viewpoint. Thursday was dubbed "Manufacturers' Day." Many men prominently identified with automobile manufacturing and selling were visitors. Noted among the out-of-town contingent were: John H. Willys, president of the Willys-Overland Motor Car Company; E. H. Sherwood, factory sales manager of the Mercer Automobile Company, of Trenton; Fred A. Harris, sales manager of the Brush Runabout Company; William E. Metzger, secretary and treasurer of the Metzger Motor Car Company; C. A.

Emise, sales manager of the Lozier Company; Frank S. Brant, president of the Chadwick Engineering Works, Pottstown; George A. Kissel, president of the Kissel-Kar Company; J. I. Handley, president of the American Motors Company, of Indianapolis, and a host of others.

For business activity the show reached its climax Friday afternoon and evening. Never before have so many cars been sold. This applies to both the expensive machines and to the light moderate priced car, the latter type by reason of their adaptability having made giant strides in popularity.

In addition to the "57 varieties" of cars on view, a score of accessories dealers held forth with all the latest appliances in the way of motoring helps. This side feature while not as large a one as might be desired was nevertheless a complete exposition of all that was newest.

Supplementing the big show are numerous individual exhibitions that have entertained throngs attracted to Automobile Row during the past week. One of the largest of these is that of the Buick Motor Car Company, Nos. 235-237 North Broad street, where the entire exhibit of the Madison Square Garden show is installed, 6,000 square feet of floor space being given over to the display of twenty-four different models of Buick cars. The Lion Sales Company, formerly the Motorette Company, of Philadelphia, is holding an exhibition of Lion cars and pleasure and commercial motorettes at the local show rooms, 234 North Broad street. The recently organized Ottomobile Company is holding a two week's independent exhibition at No. 2037 Market street. One hustling dealer, W. Wayne Davis, has been conducting practically three exhibitions, showing the Everitt car in the First Regiment Armory, at the showrooms, Broad and Green streets and in the dining room of the Continental Hotel.

## Cold Hurts Milwaukee Show

MILWAUKEE, Jan. 22—Nearly 40,000 persons attended the fourth annual Milwaukee show, which was held in the Auditorium at Milwaukee, Wis., from January 13 to 19 inclusive and represented the second effort of the Milwaukee Automobile Dealers' Association as motor show promoters. The average daily attendance was in excess of 4,750 and reached as high as 6,770.

In spite of the immense success of the Milwaukee show this year, there is a strong sentiment toward a later date, and especially a date which will follow the Chicago exposition. The week selected this year, January 13 to 19, was undoubtedly the most advantageous to be had from the dealers' standpoint, for a three weeks' cold wave held over for the exposition and time hung heavy on their hands. But the show is not alone for dealers, but for the public, and it is admitted that, if a show is to be worth anything in the way of inducing sales at retail, a cold wave is not the psychological time to conduct a show.

Not until Monday or Tuesday did some of the dealers have their show cars on the floor. Railroads were unable to make deliveries on schedule because of the cold weather.

This year's show was in no conceivable way a disappointment. In fact, it was the most satisfying thing Milwaukee has ever presented. Exhibitors this year say they sold approximately 400 cars in the aggregate, but it is safe to say that not more than 20 per cent. of these were sold to individual buyers.

This year's Milwaukee show attracted more dealers to the city than any previous show. It was held early enough to garner in a lot of small dealers who had not yet contracted for 1912 with the Milwaukee state representatives.

The Milwaukee Automobile Dealers' Association will realize a profit of about \$5,000 from the show, although it is not the intention to make money. This profit will, as usual, be distributed judiciously, most of it going toward highway improvement by contribution to associations which are improving and maintaining stretches of highway leading out of Milwaukee.

## Big Business Show at Toledo

TOLEDO, O., Jan. 20—The Toledo Automobile Show, held this week under the management of the Toledo Automobile Dealers' Association, proved by far the most successful show ever held in this section of the country. Despite the severe weather there was an average daily attendance of over 9,000 people, and all were enthusiastic about the showing made by the exhibitors.

A pleasing feature was the unexpectedly large attendance from the farms and smaller cities of northwestern Ohio. Thousands of out-of-town visitors covering a radius of about 150 miles were present, as a result of a judicious campaign of advertising throughout the country districts.

A large number of cars, especially pleasure cars, were sold outright and many others will be sold a little later on. One firm reported the sale of more than twenty-five cars during the week. While there were numerous interested inquirers in the commercial car department, less than half a dozen sales were fully consummated for trucks. Truck exhibitors, however, express themselves as well satisfied and say that they will still reap a fair harvest as the result of their efforts.

The bulk of the demand appeared to be for the medium priced cars ranging in price around \$1,000, although a good many higher class cars were moved.

About seventy-five exhibitors took part, displaying all the cars offered for sale in this market, and all the latest things in parts and accessories. The greatest drawback arose out of the crowded condition. The largest available enclosure in the city was secured for the show, but even this proved inadequate for the occasion, and business was more or less hampered as a result. The show was held in the big Terminal Belt depot and yards on Cherry street, the sheds being walled in.

One of the results of the show is that it has placed perhaps more than a score of new men in the automobile business in northwestern Ohio. Toledo dealers who had open districts in this territory found no trouble in closing it up for sub-dealers.



General view of Wayne Pavilion, where the Detroit Show is staged

## 75 Makes of Vehicles at Detroit Show

### But One Home-Built Car Is Missing from Exhibition

Church-Field and Grinnell Feature the Electric Cars

Detroit and Belmobile, New Gasoline Cars Shown

**D**ETROIT, MICH., Jan. 23—Detroit's eleventh annual automobile show, under the auspices of the Detroit Automobile Dealers' Association, opened last night with every car in place and a good-sized crowd at the pay gate.

In its general scope this is unquestionably one of the largest and most important local shows scheduled for this year, with the possible exception of Boston, and the D. A. D. A. made this possible by building a temporary annex to the Wayne pavilion at a cost of more than \$10,000.

With the single exception of the Auburn, every car manufactured or handled in Detroit is represented in this show, the list including seventy-five different makes of pleasure and commercial cars. There are eighty-three exhibitors, including about a score of accessory dealers or manufacturers, forty-three of whom have space in the main building and forty in the annex—a creditable showing considering the fact that members of the Motor Accessories Association are not permitted to participate in local exhibitions.

The opening night's patronage fully met expectations and gives promise of a record-breaking week. The Eastern dealers are already present in large numbers and hotel accommodations are taxed. The West and South sections are also well represented and the visitors without exception have expressed themselves as well pleased with what they have found.

There are a number of cars that are being shown here for the first time anywhere. Conspicuous among the novelties is the new Church-Field electric, just brought out by the Church-Field

Motor Company, of Sibley, one of Detroit's down-river suburbs. It is claimed to be the first electric pleasure car ever built with a two-speed planetary transmission, which enables the car to climb a hill on low speed. Other talking points are an underslung body and a consequently low center of gravity, a control with ten speed points instead of six and the control lever mounted on the steering column, and a specially designed motor, rigidly mounted in the center of the chassis and connected with the rear axle by a straight-line shaft drive. The body is of classic design and the interior is richly upholstered. The car is of standard tread and has a 100-inch wheelbase.

In addition to the coupé, the company plans to manufacture a roadster model but the total output of cars will be limited to a small number this year. Austin Church and H. George Field are the moving spirits in the new venture.

Another new electric that makes its debut at this show is the Grinnell Electric Car Company's latest model, K, a roomy, luxurious coupé of the Colonial type, with a 92-inch wheelbase, elliptic springs both front and rear, shaft-drive transmission direct through the springs, a hand-made body with moldings carved out of the solid wood, leather fenders fully enclosed and superb fittings.

Two brand-new gasoline cars, each selling under \$900, are the Detroit and Belmobile. The former was announced several weeks ago, but this is the first time it has been exhibited. It is the product of the Briggs-Detroit Company, recently incorporated with a capital stock of \$200,000, of which 80 per



cent. has been paid in. With its long-stroke motor, 104-inch wheelbase, its unit power plant and four-cylinder motor, cast en bloc, and its roomy body of the English torpedo type, it is a car to command attention and it is doing so. The Barber Motor Sales Company, with Zach C. Barber, formerly a distributor for the E-M-F line, as general manager, has been organized to take charge of the sales of the Detroit in Michigan. The Briggs-Detroit Company has secured a factory on Holbrook avenue and is prepared to turn out 1,000 cars this year. W. S. Lee has been appointed chief engineer of the concern. In addition to the touring car described above the company will manufacture a light roadster.

The Belmobile is the product of the Bell Motor Car Company, of Detroit, the organization of which has just been completed, and the car shown is the first one put out. It is a two-passenger roadster with a 100-inch wheelbase, elliptical rear

springs, 38 inches long and 1 3/4 inches wide, and semi-elliptical 35-inch springs in front; a sliding gear transmission, selective type; wheels, 30 by 3 inches; a 20-horsepower motor, French brake rating; Thermo-Syphon system of water distribution, a multiple-disk clutch and a Bosch magneto. The body is of the low, racy semi-torpedo type, with a 33-inch hood and a 15-gallon oval tank, placed behind the seat. The body is finished in dark blue and the chassis and hood in gray, a very effective combination.

The showing of commercial cars is a creditable one, comprising every type from the light delivery car priced as low as \$610 up to the ponderous \$5,000 brewery truck.

The chief drawback of the show seems to be a lack of space. All the exhibitors have been taken care of in one way or another, but they are badly cramped for room in some instances and cannot display their cars to the best advantage.

## Rochester, Boston, Cincinnati and Phoenix in Line

### 200 Cars Showing at Rochester

ROCHESTER, N. Y., Jan. 24—Two hundred automobiles of various models representing an aggregate cost to the various local dealers of \$200,000 are on display at the fourth annual automobile show which is being held this week in the New York State Armory, this city, under the auspices of the Rochester Automobile Dealers' Association. Many local dealers were unable to secure space at the Armory for exhibition purposes and they will display their automobiles at the Buffalo show to be held February 5-10.

The show was opened on Monday evening at 8 o'clock by Mayor Edgerton, of Rochester, who was accompanied by city and county officials. The mayor pressed the button and immediately myriads of electric lights flashed down upon the beautiful cars on display, making a splendid spectacle.

Pleasure vehicles are being displayed on the ground floor space while in the basement of the Armory trucks and accessories are on exhibition.

### Preparing for the Hub's Two Shows

BOSTON, MASS., Jan. 22—The shows to be held in Mechanics building—the pleasure car exhibition from March 2-9, inclusive, and the commercial vehicle show from March 13-20, inclusive—promise to surpass anything of the character ever held in this country. All the big exhibits which created such a sensation in the metropolis will be shown in Boston together with many others which did not exhibit at New York. Practically every inch of space has been taken for the pleasure car show and the exhibition promises to be a revelation as compared with former shows. For the first year the Boston Commercial Motor Vehicle Association will hold a separate show and Mechanics building has proven hardly large enough to house the many splendid exhibits of commercial and utility vehicles.

The pleasure car show will have its social side as will also the truck show. Manager Campbell will spend thousands of dollars to beautify and properly decorate the building.

### Cincinnati Show in Two Sections

CINCINNATI, O.—The Cincinnati Automobile Show, for the first time, is to be held in two sections, the first from February 19 to 24 for pleasure cars only; the second from February 25 to 28 for the motor trucks. Interest on the part of exhibitors has developed so keenly that forty-six of them made application for twice the available space in the pleasure car part.

### First Phoenix Show a Success

PHOENIX, ARIZ., Jan. 21—The first automobile show ever held in Arizona closed here last night. The exhibition was known as the Phoenix Auto & Commercial Show and was held in the new brick-concrete garage of the Arizona Motor Company. Every inch of the 1,200 feet of floor space was taken and more space could have been sold. The success of the affair caused the promoters, Mark Dunbar and George F. Gardner, to decide to make it an annual event. Next year a temporary building, as large as is required, will be erected for the purpose.

Practically all the Phoenix garages had space at the show. Cadillac, Cutting, E-M-F, Flanders, Liberty-Brush, Franklin, Hupmobile, Hudson, Mitchell, Regal, American, Apperson, Velie and Buick cars were exhibited. A number of Phoenix merchants took advantage of the opportunity to display their manufactures and wares.

### News of Other Local Shows

DENVER, COL.—The Eleventh Annual Denver Automobile Show, the representative of the Rocky Mountain region, will be held in the Municipal Auditorium March 12 to 16 inclusive, a week later than originally planned. There is available 15,200 square feet of exhibit space for passenger, freight, motor cars and motorcycles. The sixty boxes will be occupied by exhibitors of accessories. Practically all this space has already been subscribed for. Twenty-six dealers, representing forty-five lines of cars, practically every machine sold in the city, have signified their intention to exhibit.

WASHINGTON, D. C., Jan. 20—Owing to the inability of the show committee to secure Convention Hall during February, the present prospects are Washington will not have a show this year. When the committee was organized several weeks ago a tentative date—February 1-7—was selected, but since then it has been ascertained that Convention Hall, the only suitable place in Washington in which to hold a show, is under rental for practically the entire month of February. A meeting of the dealers will be held during the coming week for the purpose of deciding the question whether a March show is desirable or advisable.

DUBUQUE, IOWA—On account of the extreme cold making it impossible to prepare the automobile show scheduled to begin on the 22d instant, it has been postponed until some time in the spring.

TORONTO, ONT.—The Canadian National Automobile Association announces that the national show will be held at the St. Lawrence Arena, Toronto, February 21 to 28.

# Late Developments in the Legal Field

## Progress in Chain Suit—Delay in Dyer and Horn Cases

### Chain Men Look for Hot Fight

**A**NSWER to the suit of the Weed Chain Company has been filed by the Atlas Chain Company and the matter will come up for hearing or replication before Judge Lacombe in the United States Court on Friday, January 26.

The answer alleges the defense outlined in *THE AUTOMOBILE* last week, setting up the two decisions of the federal courts which hold that a loose-fitting chain, falling to the ground in front of the wheel by gravity, to be no infringement of the Parsons patents.

The attorneys for the complainants predict that there will be the hottest sort of a legal battle in this case and the Atlas side agrees that it will be satisfactorily warm.

The course open to the litigants that will lead to the quickest determination of the case is to join issue on the answer of the Atlas company, but the complainants now have the opportunity to demur to the answer, demand fuller particulars or to set up by way of reply new facts that will require another set of pleadings on the part of the defendant.

The Atlas chain fits loosely upon the automobile wheel and in the center row of steel non-skids, the transverse chains holds a series of steel studs that are larger than the usual type. This series of studs, together with the looseness of fastening, are the chief features of the Atlas product.

In the story in *THE AUTOMOBILE* of last week, which referred only to the chains made by the Atlas Company, it was stated that under the injunction granted by the United States court prohibiting the manufacture, use or sale of the chains pending the determination of the existing phase of the matter, the Atlas exhibit had been summarily closed. This was all true, but did not have anything to do with other products made and displayed by the Atlas company, which were not affected by the terms of the injunction.

### Dyer Cases Over Until March

Answers on behalf of the defendants in the suit of the Enterprize Automobile Company against the Maxwell, Winton, Locomobile and Saurer companies were due last Monday in the United States District court, but prior to that time another stipulation between the parties was entered providing for a delay until the first Monday in March.

As the day for this important step in the proceedings draws nearer the interest of the automobile industry grows stronger. Both sides express unlimited confidence and the indications are for a fight that will outdo the Selden litigation in importance.

The Dyer patents are so astonishingly broad that if they are sustained, they will affect the whole industry. On behalf of the patents it is claimed that while they are dated in the later part of the past decade, the applications on them go back to 1900 and with the margin of 2 years allowed by the patent office to cover the prior art, takes the patents back in effect as far as 1898. The defendants rely upon a vast mass of statistics, patents and antecedent art covering the points in dispute to overthrow the patents.

Rumors of possible compromises have been set afloat, but neither side will admit that it is responsible for them. One was to the effect that the sum of \$75,000 and a royalty had been tendered to the Dyers by a group of manufacturers. The Dyers would not confirm the rumor and the group of manufacturers could not be located.

### Electric Horn Suits Lag in Court

Rather slow progress is being made in bringing the electric horn litigation to a direct issue before the United States courts. The only move of the past week has been some advancement in the suit of Klaxon against Newtone. The record shows that on December 20 the complainants offered to close their *prima facie* proof. The Newtone side, however, decided to continue the cross-examination of Edwin H. Hammer, an expert witness for Klaxon. This continued through thirteen days and closed on January 13. A motion was made by the defendants to compel further answers by this witness, which was disposed of January 16.

Up to January 22 neither taking of testimony nor the fixing of a day for so doing on the part of the defendants had been accomplished. Under the existing stipulation it has been agreed to close the taking of testimony by February 20 so that final hearing may be had before adjournment for summer vacation.

The Klaxon suit against Ever Ready and others remains in *statu quo*.

### Correja Owner Sued by Dyer

In order to test the validity of the Dyer transmission patents prior to the hearing of the cases directed toward four big automobile companies, suit was filed Tuesday against Royale H. Fowler, who is alleged to be the owner of a Correja car equipped with a selective transmission.

It is understood that the suit will be defended by Vandewater & Company, makers of the car at Elizabeth, N. J., and before it is concluded it is expected that it will involve some of the highest interests in the industry. According to information derived from the complainants, the defendants expect that the Automobile Board of Trade will take a hand in the proceedings.

As the Vandewater Company is not a member of that organization, and as the Board of Trade has no official interest in the particular patents involved, the likelihood of it becoming a party to the suit is remote.

### Creditors Hope in Carhartt Case

The affairs of the Carhartt Auto Company, which has been in bankruptcy in the United States District Court for several months, have been referred to a master for testimony, examination and report. The company's assets are making a good showing and creditors now feel that individual losses will not prove of much importance.

### Jersey Senate Passes Truck Chain Bill

TRENTON, N. J., Jan. 23—The Colgate bill allowing the use of chains on automobile trucks in New Jersey was passed by the Senate yesterday, the vote being twelve to six. There was a sharp debate before the matter passed, Senator Gebhardt contending that the present rule prohibiting the use of chains should be continued and saying that the relaxation of the rule would cut up the roads. The main body of the Senate, however, did not take his view of the situation and the measure went through with a whoop, the arguments of the advocates of the measure being most convincing.



# Latest Industrial and General News

## Finish of Truck Tests—Reorganizations—New Knight Car

### Mason to Make Knight Car

**W**ATERLOO, IA., Jan. 24—Official announcement is made by the Mason Motor Company that it will put out a line of cars this year equipped with the Knight sleeve-valve motor in addition to its old line of two and four-cylinder cars. The company recently held its annual meeting and authorized the change in name from Maytag-Mason to Mason.

According to the announcement, the license to use the Knight motor possessed by the company is the only one held West of the Mississippi river. The price of the Knight equipped line has not been made public.

### Coey-Mitchell Company Reorganized

**CHICAGO, Jan. 23**—There has been a reorganization of the Coey-Mitchell Automobile Company, with a capital stock of \$250,000, and plans have been made to secure possession of the plant of the Fall Motor Company, which went into bankruptcy some time ago and which is located at May and Randolph streets, this city. C. A. Coey has been elected president of the reorganized company, with Chas. Little, vice-president, and Fred Starnes, secretary. It is planned to build 500 cars for 1912 delivery. There will be but one chassis, but different kinds of bodies will be offered. The motor will be a six-cylinder with 4-inch bore and 5-inch stroke, with 124-inch wheelbase.

### Case Buys Truck Factory

**MILWAUKEE, WIS., Jan. 22**—As part of the immense expansion policy adopted by the J. I. Case Company, of Racine, Wis., which recently increased its capital from \$5,000,000 to \$40,000,000, the Case company has taken over the entire plant of the Stephenson Motor Truck Company, of Milwaukee, manufacturing the Utility and Stephenson light and heavy cars for commercial purposes.

The Case company already owns a large pleasure car plant, formerly the Pierce Motor Company, of Racine. The deal with the Stephenson concern involves approximately \$500,000. The works are at South Milwaukee and have recently been considerably enlarged.

### Alco Truck Ends 14-Day Run

Hauling over 220 tons a distance of 922 miles and covering 14 days without stopping its motor, an Alco 3 1-2-ton truck completed a remarkable service test January 20 at 5 o'clock in the morning.

The trial commenced January 6 and continued without a break until 14 days had elapsed.

Following is a tabulation compiled by the Alco company showing the particulars and details of the test:

Date	Miles	Trips	Stops	Pounds hauled
Jan. 6.....	74	13	104	19,000
" 7.....	61	21	90	33,600
" 8.....	59	14	92	31,450
" 9.....	64	12	102	27,425
" 10.....	62	12	92	27,187
" 11.....	67	14	103	36,645
" 12.....	65	13	98	38,890
" 13.....	59	14	89	30,500
" 14.....	86	22	50	19,050
" 15.....	71	13	84	27,500
" 16.....	63	13	95	37,460
" 17.....	70	12	96	43,978
" 18.....	62	13	94	29,660
" 19.....	59	12	95	37,800
Totals .....	922	198	1284	441,135

### Motorette to Be Reorganized

All the assets and property of the C. W. Kelsey Manufacturing Company, which manufactured the Motorette, have been sold to a new company, now being formed, which will continue to make the three-wheeled car at Hartford. Announcement is made that in addition to the gasoline-driven car there will be one model using electricity for driving power.

In speaking about the company's affairs Mr. Kelsey said that the defunct company had 2,558 undelivered orders on its books at the end of the season, and that inability to get certain vital parts of the car was the chief reason for the failure.

According to Mr. Kelsey the policy of the new company will be to enter numerous sporting and contest events.

### New Truck Tire Factory Planned

**CHICAGO, Jan. 23**—The Dryden Hoof Pad Company, of which Geo. B. Dryden is president, has bought a factory site at Forty-Third avenue and the Baltimore & Ohio Chicago Terminal Transfer railroad tracks, where it is proposed to erect a building containing 60,000 square feet of space, which will be devoted to the manufacture of pneumatic and solid rubber truck tires. It is expected that about 800 men will be employed and that the capacity of the plant will be 200 tires per day.

### Thomas Walburn III—Kills Himself

**DETROIT, MICH., Jan. 22**—Local motor circles were shocked by news of the tragic death of Thomas Walburn, manufacturing manager of the Studebaker Corporation's E-M-F plants, Saturday morning, when he shot himself in his home at 104 Burlingame avenue. Mr. Walburn has been suffering from stomach trouble for several years.

### Federal License Bill Entered

**WASHINGTON, D. C., Jan. 23**—Another federal registration bill for automobiles used in interstate traffic was introduced yesterday by Representative Volsted of Minnesota. The fee is fixed at \$10. The effect of the bill is to release the owner of such an automobile from all license charges except those of the state in which he has his residence.

### Figures on Decatur Truck Trial

Official figures covering the recent sanctioned non-stop test of a Decatur 1 1-2-ton truck have been tabulated by the Contest Board of A. A. A. The run lasted 168 hours and was observed by three officers of the A. A. A., namely, Messrs. Camacho, Thompson and Hossenlopp. They worked in approximate eight-hour shifts, and it was their duty to record every stop of the car or motor and to note every incident out of the ordinary.

The truck covered 1,063 miles on 152 gallons of gasoline and 51 1-2 pints of oil, or about 7 miles to the gallon. Taking only the bare figures, this showing is unfair to the truck because from about 2 o'clock Thursday, January 11, until 5 o'clock in the afternoon the truck was laid out while a new rear-axle was installed. In the darkness of the early morning the truck ran into a pillar of the elevated railroad structure on Ninth avenue and bent back the rear axle so seriously that the car was put out of commission as far as running was concerned. The motor was kept going all the time until the repairs were finished and the engine used up a tank full of gasoline.



Banquet of the Colt-Stratton Company at Healy's Was Well Attended.

## Commercial Show Results Gratifying

### Sales, Actual and Prospective, Reported by All

Total Attendance for the Week Nearly 70,000

EVERY exhibitor during truck week at Madison Square Garden went on record as having done more business than ever before at a truck show. A careful canvass of the building showed that in every space occupied the sales forces and demonstrators had been busy from opening to closing time almost every day.

The attendance is roundly estimated at between 63,000 to 70,000 during the week. On two days the crowds approximated 14,000. On opening night the crowd numbered about 8,000, but in the closing session it probably did not exceed 5,000. But from first to last those who did attend the show were there for business.

There was more thorough investigation of mechanical phases than ever before; more actual search on the part of business men to solve the problem of transportation as presented to them individually; more real sales and good prospects than ever before.

There was a decrease in the direction of municipal business, owing largely to the fact that fewer models were shown that were specially fitted for fire-department service. This condition is the result of specialization on the part of a few companies and the fact that some of the concerns that have gone deeply into the building of fire apparatus did not exhibit at the show. The Knox, Pope-Hartford, Saurer and a few others showed various types of apparatus or chassis suitable for fire-department work. In fact, there were numerous companies whose standard cars are similar to the general lines required in certain departments of that service.

Some inquiry was received from municipalities for cars suitable to use for street cleaning, garbage and ash removal and for sprinkling. The auxiliaries characteristic of each branch of service were not shown in much variety and the inquiry was largely for chassis capable of operating such auxiliaries.

10,000 Special Invitations to Probable Users Honored

The show committee, weeks ahead of the opening of the truck exhibition, prepared a list containing nearly 20,000 names of prospective truck users. To each person on the list an invitation was directed offering free admission to the show and other facilities for examining the progress made in truck manufacture. Up to Friday night something over 10,000 of these invitations had been heard from and an estimate of the Saturday attendance shows that practically 2,000 more were reported on the last day.

This great body of 12,000 interested, prospective purchasers formed one of the characteristics of the 1912 show. There were no sightseers among this division. It could be reckoned with certainty that nineteen out of twenty who took the trouble to attend one or more of the sessions were there to make a careful inspection of the truck field as presented, with the idea of installing power-propelled vehicles in their own lines or to replace present equipment, either of horses or earlier types of automobile trucks.

In passing around among the exhibits the fact was impressed upon the visitor that unfounded statements were being shelved and that approximate facts were presented by the sales forces. In any commercial line where there is sharp competition, such as is present in the truck field, there is always a certain amount of exaggeration. There is always a tendency to figure a good prospect as an accomplished sale and a dim prospect as being good. There is a universal tendency to give one's own line none the worst of an estimate. But making due allowance for optimism, the hard fact remains that every exhibitor made some sales. These range from fifty or more down to three or four, to take a conservative attitude.

Naturally, the exhibitors declined to go into specific figures for publication and a few of them, especially those who handled small trucks and wagons, estimated their sales higher than the



high limit figure given above. But as careful a revision as could be made under the circumstances indicates that the limits are not far from right. As far as could be determined 413 trucks were actually sold during the show. Possibly as many more will be disposed of within the next week as the direct result of work done at the show, but the most telling effect of the exhibition will be found in its influence on business clear to the end of the year, perhaps longer.

As has always been the case, the bigger the truck shown the more attention it attracted. The great vehicles shown by Hewitt, Pierce-Arrow, Morgan, Knox, White, Lozier, Mack, Saurer, Locomobile and the others that rated at 5 tons and over were constantly surrounded by interested throngs. The Packard, Alco, Peerless, Garford, Grabowsky, Sampson, General Motors and others received an immense amount of careful inspection, and the mixed lines and little fellows came in for the busiest week in their history.

The inquiry this year was broader than last. In addition to the lines followed by it in previous years, there was a vast amount of new business indicated in it. The department stores were about as keen for delivery wagons, but they also seem to have gone into the big car lines for freighting vehicles and depot work. The express companies were apparently in the market for considerable new equipment, judging from the number of chief engineers of such concerns that were to be seen looking over the exhibits. So far as was learned there were no actual purchases on the part of such concerns, but every company that makes a suitable wagon for express service has them all tabbed for further argument.

With regard to the big coal and sand dumping trucks, the sales closed were small in number but important in size. Big contracts for such vehicles are rarely closed during show week, but there was a large amount of comparison and inspection indulged in by engineering and contracting companies. There were five or six splendid examples of dumping bodies displayed and each was carefully examined by men who will undoubtedly buy such vehicles in the near future.

The small cars met with the biggest sales, as usual, as far as

numbers are concerned. The liberal guarantees applied to them seemed to be one of the most attractive elements. But, as a general thing, the fear that a truck will not operate somehow under all conditions and with complete satisfaction, if properly cared for and maintained, has disappeared. This is particularly true of the class that has employed them for a year or more. Proper maintenance has been accepted as an axiom among the buyers, no matter how far from the mark actual practice may be.

The electric enjoyed an excellent patronage from the class of customers whose transfer business is largely staged in the midst of dense street conditions and traffic.

All told, it was a great business show, with few complaints from exhibitors and general satisfaction the general rule.

### Show Season and Its Prospects

"The recently closed season of automobile shows has marked a new era in the automobile industry," said H. A. Bonnell, general manager of the Automobile Board of Trade. "Records were broken all around and the general aspect of the industry is more than hopeful.

"The pleasure week demonstrated that interest in the automobile is still far from high-water mark and that successive years will show still larger attendance figures.

"The truck show was a wonderful demonstration of progress and proved entirely successful. The attendance during both weeks was gratifying to the management, and I believe the exhibitors were all well pleased. The amount of business done at the truck show was a revelation."

Speaking of the future of New York shows, Mr. Bonnell said without qualification that the Grand Central Palace was under lease to the Automobile Board of Trade and the Arena was included in the arrangement. The lease of the show committee on Madison Square Garden has some time still to run and the only question that could be raised with respect to it might come up over a construction of the law as it applies to the change of landlords. On its face, the lease would hold despite any changes in ownership or tenure of the building.

### Preparing for Chicago Show

CHICAGO, Jan. 23—The National Association of Automobile Manufacturers has taken possession of the Coliseum and First Regiment armory, and at the present time workmen are busy installing the decorations and preparing the two buildings for the opening of the Eleventh National Show next Saturday afternoon.

The show this year will be somewhat larger than its predecessor in that there will be 96 different makes of pleasure cars shown as against 94 last year, whereas the commercial display will bring together 82 different makes in comparison with the 51 that were on view a year ago. There also has been a strengthening in the accessory department and the list shows 201 different concerns as against 191 in 1911.

It is anticipated that there will be a larger attendance of dealers this year than there was at the Tenth show, the N. A. A. M. having sent out 5,000 invitations to dealers in this territory.

The decorations in the Coliseum this year differ radically from those of last winter. The Coliseum decorative scheme is quite striking in its general effectiveness. The ceiling will be covered to enhance the effect of the general decorative scheme. The girders will be hidden by a mosaic design relieved at intervals by mural paintings, the whole effect being light in color, with amber and gold predominating. The space in front of the gallery will be paneled in the same effect, relieved by masses of colors and surmounted by a picket fence running around the gallery front, the fence being decorated to correspond with the ceiling. The end walls will be covered by drop curtains.

### Coleman Dines Department Heads

AMONG the informal luncheons held during show week, none was perhaps more interesting and enjoyable than the luncheon tendered by President Charles Philip Coleman, of the International Motor Company, to the heads of the various departments of this largest exclusive motor truck organization in this country.

Mr. Coleman's guests included: J. M. Mack, vice-president; F. C. Richardson, treasurer; Vernon Munroe, secretary; F. R. Phillips, general superintendent Plainfield works; W. S. Stevenson, general sales agent; Arthur C. Brady, assistant general sales agent; H. D. Watson, Eastern sales manager; William Thompson, Western sales manager; A. T. Murray, factory sales manager, Allentown works; R. E. Fulton, New York sales manager; R. C. Gilder, superintendent Allentown works; A. MacDonald, production engineer, Allentown works; W. W. Wieand, general purchasing agent; B. A. Guy, general auditor; E. A. Starks, service manager; H. P. Childs, manager Philadelphia branch; W. R. Mason, manager Albany branch; D. C. Fenner, New York sales representative; H. A. Seller, San Francisco agent; W. L. Van de Wiele, statistician; R. W. Hutchinson, Jr., advertising and publishing manager.

After discussing a delightful menu Mr. Coleman discoursed at length on the science of truck salesmanship and service, specially urging his hearers to be courteous, and prompt in attention to purchaser and to the truck purchased. He opined that the majority of their difficulties were in keeping the customer satisfied, after making promises that were extravagant.

# Society of Automobile Engineers Meets

Eighth Annual Gathering Noteworthy for Interest and Work Done

## Much Progress Made in the Standardization of Parts

**P**RECEDING the closing of the Automobile Show by only a few hours, the annual winter meeting of the Society of Automobile Engineers came to an end last Saturday afternoon. The three-day session was held in the Assembly Room at Madison Square Garden and the total registration was the largest in the history of the organization, there being an array of 360 names on the list. A number of able engineers and men high up in the industry, together with several well-known manufacturers from abroad, were in attendance.

Taken as a whole, the gathering was perhaps one of the most noteworthy of its kind on record. The wide range of pertinent subjects which were taken up demonstrated that the Society is fast becoming one of the most potent factors in the automobile and allied industries. The papers read and the discussions which followed contained much of educational value not only to the engineers present but to the public at large.

The session was opened on Thursday morning with an address by President Henry Souther, who outlined the work of the various committees and spoke very flatteringly of the Society's future. The total membership is about 1,200, it being about twice the enrollment at this time a year ago, according to Mr. Souther's figures.

Coming, as it did, in conjunction with the commercial section of the Garden Show, there was very little outside entertainment planned, and the time was largely taken up by professional

## H. F. Donaldson Chosen President for Current Year

subjects. Following the president's opening address, the accumulated business matters were first disposed of, after which the real work of the session was begun, nineteen papers and the reports of some ten committees being read and fully discussed before it was finally brought to a close on Saturday.

While professional matters were the rule, all ultra-serious considerations gave way to the Society's annual banquet held in the Belvedere Room at the Hotel Astor on Friday evening. Here several interesting addresses were delivered, the vaudeville entertainment of former years being abandoned. President Souther further emphasized the Society's potentiality, and enumerated several reasons for the rapidly increasing membership. On Saturday the remaining papers were read, a short afternoon session being called so as to include the rest of the subject matter which had been prepared. Perhaps one of the most important results of the gathering was the adoption of a number of the recommendations of the various divisions of the Standards Committee. Various rules and empirical formulæ tending to make the engineer and manufacturer more clearly understand one another and to eliminate misunderstandings which result from the lack of standardization were adopted. Matters in connection with commercial cars were taken up on Thursday evening, and the morning session of this same day was greatly enlivened by Henry F. Donaldson's description and report of the first European visit of the Society.

## Souther Reports 1200 Members and Work of Past Year

**T**HE eighth annual meeting of the Society of Automobile Engineers convened Thursday morning at 10 o'clock in Assembly Hall, Madison Square Garden, with about forty members present. Before the proceedings were well under way the hall began to fill and at the conclusion of the lively debate and discussion following the submission of the report of the iron and steel specifications committee there were fully 150 in the hall.

The chief matters under consideration were the address of President Souther, covering the work of the society during the past year, and the election of officers wherein Henry F. Donaldson was chosen president to succeed Mr. Souther. The professional session included the submission and acceptance of three reports and the submission and partial debate of a fourth, final action upon which was deferred until Thursday afternoon.

The meeting opened without ceremony, President Souther plunging into his report at once. Among other things, he said:

In January, 1911, we had 614 members; in June, 1911, we had 899, and at the present time we have a membership of 1200. These figures include membership of all grades, full members, associates and juniors. We also have a few affiliated members, that is corporations who have joined since the constitutional amendment providing for such grade was passed last June.

It is my opinion, and the opinion of the Council and of those most familiar with the possibilities before the Society, that the membership is not being increased too rapidly and that the Society is not attempting to embrace members whose qualifications are too far from those of the strictly automobile engineer. It is my opinion that there is room for both classes of effort, that is pure engineering and manufacturing in all their phases.

It is desirable that the engineers of our Society should prepare technical papers and bring about an advance in technical and theoretical knowl-

edge. It is equally desirable that our factory managers, purchasing departments, cost departments, and others, should interest themselves in the affairs of the Secretary. The work of the engineer would be useless without the coöperation of these other branches of the industry; and so would the work of the factory be incomplete without the coöperation of the engineer. Therefore, they should be found together in our Society in order to round out its sphere of usefulness.

Research work in the preparation of engineering papers is slow work, requiring considerable time and often money. Here, the coöperation of our manufacturers is urged. Individual members cannot be expected to furnish the necessary money to carry on research. On the other hand, some of the companies interested can well afford to contribute to the welfare of the industry in this way.

Since our last meeting a Technical Committee has been appointed by the Automobile Board of Trade. This committee was formed with the idea of doing original work and without any idea of repeating work that is being done by this society. Such standards as we adopt the Automobile Board of Trade stand ready to endorse, provided, of course, the Technical Committee approves. They have been invited to suggest providing they do not approve. The work of this committee should be made a valuable one, and it is hoped that in some way or other the work of the Society and of the Automobile Board of Trade may be made mutually beneficial.

The work of the Standards Committee has progressed as rapidly as is safe. There has been much time given to the work of the various divisions by many members whose time is very valuable. The results still pending on some lines of work are being expectantly awaited by our members and the automobile industry in general.

When the work of the Standards Committee was first outlined, it seemed that some of the objects sought might never be attained—that it was impossible to standardize certain things. It is very gratifying to be able to report that some of the most difficult things attempted have actually been accomplished and are in effect. Particular reference is made at this time to the standards for truck wheels. Several powerful corporations have made public an announcement to the effect that beginning January 1, 1912, no other truck wheels would be furnished than those conforming to the standards of the Society of Automobile Engineers.

The Truck Standards Division has been formed since our last meeting. It is important to note that the formation of the division is during the early history of extensive truck manufacture. There is no time so favorable for the adoption of a standard as in the beginning of an industry. During the early history of any industry there is less difficulty in establishing a standard than later, for the simple reason that there is less to



undo. A young industry has not set up many standards of its own that it would cost a great deal to change. On the other hand, there is not sufficient data available to establish many standards. Neither engineer nor factory manager knows enough to select that which is just right. Nevertheless, it is apparent that there are some things in connection with truck manufacture that can be standardized now just as well as later, and the function of this division is to establish standards and to continue adding to these standards just as fast as it is safe to do so.

Treasurer A. H. Whiting reported that the organization was in flourishing condition financially. His report covering the last three months of 1911 showed that the receipts had been \$11,383.14 and the expenditures were \$9,350.45. The balance, including the balance of October 1, was over \$2,300.

The election of officers was practically unanimous, the following being chosen: Henry F. Donaldson, president; H. W. Alden, first vice-president; H. L. Pope, second vice-president. Council members to serve two years: C. B. Whittlesey, A. B. Cumner and A. L. Riker. Treasurer, H. F. Cuntz.

As the session began after schedule, other business matters were allowed to go over and the professional session was commenced. The first thing on the program was the report of the iron and steel specifications by President Souther as chairman of the Standards Committee.

### Donaldson Assumes the Chair

When the chairman finished reading the report, President-elect Donaldson having been called to take the chair, it seemed as if it was about to be adopted without discussion, but gradually the membership woke up to the importance of the report and for over one hour a continuous fire of remarks, comments and explanations enlivened the proceedings.

Professor F. R. Hutton commenced the battle by suggesting that the report be accepted by the society, pointing out that President Souther had explained that the report did not represent the final word in the work of the society along this line, but rather was a long step in a continuous process along the way toward perfection.

George F. Fuller really fired the big gun of the campaign when he took the platform and said that he endorsed the work of the committee as far as it had gone. He said that it had only made a good start and called attention to the fact that a most important point had been overlooked.

He said that the chief end to be accomplished by the formulation of steel specifications was to make more certain the attainment of the wishes of purchasing engineers by aiding them in the selection of appropriate metals, and yet, he said, all the specifications in world would do no great good unless there were some means to insure getting the material specified. He declared that the physical properties were the real requirement and that chemical composition, no matter how important, was not to be considered in the same light as satisfactory physical properties.

"If there is no effort made to determine the characteristics of steel delivered under certain sets of specifications," said Mr. Fuller, "there is not telling what manner of steel is delivered."

"I recommend that from 5 to 10 per cent. of any particular shipment of steel should be used in determining the characteristics of the remainder of the shipment."

Mr. Souther explained that the tests from which the data book had been compiled were based upon sectional specimens ranging from 1-2 to 1 1-2 inches in diameter.

He then went on to say that the elastic limit of crankshaft steel ought to be 70,000 pounds to be good and that 90,000 pounds was certainly good. He outlined an ideal condition where all that would be necessary in ordering special steel for crankshafts, for instance, would be for the engineer to purchase, say, 3 per cent. nickel steel with an elastic limit of 90,000 pounds.

In telling some of the details of testing steel, Mr. Souther said that the practice of drawing a coupon of steel 1-4-inch in diameter from the end of a forging, and using it as a basis of test for the whole forging, was manifestly unfair. He also said that a sample taken from the center of the forging would not represent the true characteristics of the metal, because the cen-

ter of such a forging as a crankshaft does little actual work and therefore the material is of comparatively small importance. He explained incidentally that a hollow crankshaft would be quite as strong as one of similar material that was solid.

He went on to say that steel of various chemical compositions might be made to attain the same elastic limit and approximate toughness by varying the form of heat treatment and that the difference between the very highest and most expensive grades of steel and ordinary carbon steel could be made apparent in bending tests. He admitted that specifications were not always followed by steel makers and regretted the fact that adequate tests were not always made by purchasers.

Mr. Donaldson suggested that it might be necessary for him to add a committee on ethics to the Standards Committee to deal with the enforcement of specifications as developed by the non-observance of them by makers of material. He said, however, that with a set of specifications, the automobile engineers at any rate had something to work on.

W. B. Barba advocated requiring a certificate of physical properties from the makers. In the alternative he said that a prolong should be required on castings so that the specifications could be checked up.

"Some companies," said he, use up from 5 to 10 per cent. of their driveshafts in order to prove up on the ordered steel."

Mr. Souther said that companies might order several more forgings than were necessary, if it were deemed advantageous to break up the forgings in order to check up the material.

He said that one good test of quality where a certain number of driveshafts had been ordered with elastic limit of 100,000 pounds, was to place several of the shafts in jigs and submit each of them to the full contract pressure. If they stood up, they answered specifications; if they did not, they could be rejected. In addition he also would require that thorough tests to the contract limits should be made to prove up the required hardness.

In this way, he said, there would be no loss through breaking up the forgings for testing.

The question was put to Mr. Souther as to his attitude in passing upon the acceptance or rejection of, say, 5,000 drop forgings because it appeared from tests that there was an excess of phosphorus or sulphur over the amount called for in the chemical specifications. Mr. Souther replied that chemists differ, but that .04 per cent. of phosphorus was the commercial limit and that any good steel maker is able to approximate it. He said that if the percentage of phosphorus in the product of one maker averages .042 per cent. or higher, while that of another is around .02 per cent., the price being equal for each make, the choice would naturally fall upon the maker with the smaller percentage of phosphorus in his product. He said that when considerable purchases of steel are to be made the engineer usually offers his specifications to three or more manufacturers. As a result of their bids the contract is let and it is to be assumed that the bidders have taken into consideration the chemical composition of the steel to be delivered and have made their prices accordingly. Therefore, Mr. Souther said, a material difference between the amount of phosphorus specified and the amount contained in the goods delivered would constitute good grounds for rejection.

### Steel Report Highly Attractive

He explained that the actual difference in the service and quality of the steel owing to a minute proportion of phosphorus was small.

"Where, say, .04 per cent. is the limit allowed and repeated shipments show as much as .045 the inference is carelessness or worse on the part of the maker."

Mr. Souther emphasized the importance of proper heat treatment, saying that frequently excellent steel proved unsatisfactory in service and poor steel delivered a satisfactory service through the application of improper and proper heat-treating methods.

He summed up by saying that it was the duty of the engineer to let the manufacturer know exactly what was wanted; to demonstrate that such material was delivered, and, after receiving it, it was the duty of the engineer to see that it was properly heat-treated.

J. F. Funk remarked that there was no merit in the idea of leaving an elongation on the crankshaft for testing purposes as to the composition of the steel. He said there was too much variation in the material at the end of such a forging as compared with the steel midway of the shaft.

Mr. Fuller got the floor and said that under the two heat treatments given crankshafts, the testing coupon would be useless unless it was of the same diameter as the shaft itself.

Mr. Donaldson remarked that there were many difficulties apparent in the situation and that it appeared the committee had plunged into the stream a little too precipitously.

Dr. Matthews urged more co-operation between manufacturers and buyers. He insisted that purchasers of steel should know that they receive precisely what they specified.

H. L. Pope remarked that if heat is applied slowly better results will be attained and easier forgings made possible.

Mr. Markley was heard with much attention when he said that it appeared as if the making of steel and the solution of the problem in hand was largely a matter of integrity on the part of the steel makers. He suggested that besides the regular specifications framed by the Standards Committee, each order should contain the provision: "Each element shall be the best of its kind and satisfactory to us." He remarked that according to manufacturers' certificates two shipments of steel used by his concern contained .04 and .05 per cent. of phosphorus respectively, while the test of the same steels in the University of Pennsylvania laboratory showed it to be .04 per cent.

#### Discussion on Heat Treatments

Mr. Souther and Mr. Fuller had a lively discussion of heat treatments, the former stating that while widely variant steels might be brought to the same elastic limit and degree of toughness, tests frequently proved that one would last ten times as long as another. He cited instances where steels of the same elastic limit but of different composition were tested, one would prove to be of coarse texture, while another was fine. From this he argues that there was a good reason always for selecting the high-grade steel for indicated purposes, as against the coarser grades for the same purposes.

Mr. Donaldson interjected a remark that so far in the progress

of the art no substitute had been found for engineering judgment by the formulation of specifications.

The question was then put and the report was unanimously accepted. T. V. Buckwalter presented the report on non-ferrous alloys for sheets, rods and tubes as the second report of the Sheet Metals Division.

The discussion which followed was short, Mr. Souther remarking that some of the information contained in the report, while centuries old, had never been compiled. He complimented Mr. Buckwalter for his painstaking work and the report was unanimously accepted.

Then followed the reading of Mr. Buckwalter's report on metal gauges, which was likewise accepted without material comment. One-thousandth of an inch was recommended as the unit of measurement.

The last work of the session was the presentation of the third report of the ball and roller bearings division by Chairman David Fergusson. Considerable debate followed the presentation of this report and final action upon it was postponed until afternoon.

#### Amended Ball Bearings Report

The first question that arose was as to the recommendations of Table V, which provides the limits of eccentricity in the walls of races in ball bearings. The report recommended a plus limit of .0002 inch for each wall on one side of the axis.

Mr. Souther explained that the plan had been worked out from a zero base. He said that the plan would be intelligible by reference to the diagram. Press fits and chamfers were also briefly referred to.

Mr. Hughes wished the report to be amended so that the tabulation of radial loads might be designated as average and not theoretical and ideal figures.

The reason for this became apparent when D. F. Graham arose and said that he agreed with Mr. Hughes' suggestion, and moved to strike out the columns devoted to radial loads in pounds. Mr. Graham explained that the figures applied to ball bearings and that the figures defining the radial loads of roller bearings were materially different.

This was seconded and the society upheld the amendment.

Mr. Hughes also suggested that the limits of eccentricity should be raised from .0002 to .0005 inch, stating that the former figure represented a limit too severe for many manufacturers, although, he stated, that several companies gauge their bearings to the hundred-thousandth of an inch.

J. E. Schaeffers moved that the society make such an amendment to the report, and it was while this was being argued pro and con that adjournment was taken until 2 o'clock.

## Mechanical Matters Occupy Most of the Second Session

THE early part of the afternoon session was enlivened by the description of the first invasion of England by the members of the S. A. E. The courtesies extended by the English engineers to the visitors were greatly appreciated by them and mention was made of this fact in the paper read by E. F. Donaldson. This was in connection with the report of the committee which visited England. A continuous round of invitations was offered by the various manufacturers and season tickets to the Olympic show were tendered to all those who made the trip across on the steamship *Mauretania*, this being the vessel chosen as the official carrier of the expedition. The party of 44 sailed on November 1 and arrived at London on November 7. In concluding the report of the committee it was recommended that adequate preparations be made for the next trip at least 6 months in advance. An official return steamer should also be chosen in order to avoid confusion and to enable better financial arrangements to be made with the steamship companies. The result of the trip in the opinion of those who participated was the acquisition of a valuable fund of technical knowledge.

Neither the author of the paper on Wood Wheels nor on Wood vs. Wire Wheels was present, but a discussion written by Mr. H. K. Thomas was read by Mr. Souther, the presiding officer. Mr. Thomas declared that wire wheels were not used in England only for their strength, but also for their durability and lightness. Five wire wheels, according to Mr. Thomas, would weigh about the same as four ordinary wood wheels. Objection was made to the statement that there was such a large proportion of cars driven in England by chauffeurs. This was declared to be untrue, and it was noted that a large number of the automobiles driven by chauffeurs were to be found among the town cars as in this country. Longer tire life should result from the use of wire wheels on account of their great resiliency, but the number of spokes, on the other hand, is a great drawback. This introduces the feature of difficulty in cleaning, which is one of the greatest reasons why wire wheels are not adopted by the taxicab companies in America. The cost of cleaning the cars is a very large item where a number are considered, and the advantage gained by tire saving is lost.



Mr. Baker performed experiments on the hickory spoke which was mentioned on page 4 of the paper and showed that it was decidedly inferior to the ordinary American wood spoke. It broke at 10 pounds, while the American spoke broke at 27 1-2 pounds. The early history of wire wheels was brought up, and it was shown that the greatest reason for giving them up was on account of the added cost of cleaning. According to Mr. Alden, the greatest reason for giving up wire wheels was the fact that the prejudiced public insisted upon the wooden type.

There were several references made to the failure of wire wheels in the early days, especially in 1905, when, it was declared by Mr. F. E. Muskovichs, they did not stand up owing to the number of spokes. The success of the American wire wheels on the Blitzen Benz was also pointed out, there having been some replacements made on this car, some American spokes being fitted in place of those of English manufacture. The wire wheels on this car are a success and seem to be able to fully hold their own with the wooden wheels with which the car was originally equipped.

### Worm Drive Treated at Length

The paper on Worm and Gear Drive as the ultimate drive applied to heavy power vehicles by Ralph H. Rosenberg was not read, as the author was not present until the evening session. A discussion on the paper was called for, however, and many took advantage of the occasion to express their opinions on this important and very live subject. The fact that the General Omnibus Company of London had adopted the worm drive in the face of the enormous number of gear changes per day, the average being 800, was cited by Mr. Baker as a great argument in favor of the worm drive. Worms which had been in operation for over 60,000 miles at an average rate of 130 miles per day have been examined and the signs of wear are absolutely imperceptible. At the same time an efficiency of 97 per cent. is attained. The silence of the worm drive alone was such a great advantage, in Mr. Baker's opinion, that it was sufficient cause for the adoption of this type of drive.

Mr. John McGeorge voiced the opinion that in using the Henry type of gears it was better practice to have the worm above, as better lubrication was secured on account of more uniform distribution of the oil. Mr. David Fergusson fully indorsed the adoption of the worm drive for use in heavy trucks with a reduction of 8 or 9 to 1. For the lighter trucks and pleasure vehicles this drive is still problematical. It has not as yet been sufficiently tried out. Mr. Fergusson further stated that he thought the time for the general adoption of the worm drive in cars for pleasure purposes was not very far distant. Mr. J. Lehman expressed the opinion that the worm drive was satisfactory for any degree of reduction from 6 to 15 to 1. The care used in the cutting of the teeth was the greatest factor in reducing the coefficient of friction. In some of the patented machines used abroad the teeth are practically finished as they leave the cutter. There is little or no hand work required in this case, the principal operation being that a grinding in the teeth in the same manner as valves on a gas engine are ground in. The coefficient of friction of teeth which have been turned out by these machines is about .009 or .01, whereas with hand finishing, required in this country, the coefficient reaches .025.

### A Word for the Bevel Drive Type

Mr. Ballinger, of the Arrol-Johnson Company, of England, was called upon by the chairman to express his opinions on the worm drive and pronounced himself to be of the opinion that the bevel drive could be made just as quiet, if the same care were exercised in its manufacture. This being the case, he did not see the use of expending power on the added friction of the worm drive. Mr. Lehman expressed a difference of opinion with Mr. Ballinger and stated that the loss of power through friction was by far greater in the case of the bevel drive than in that of the worm drive. In his opinion, the best result that could be secured with the bevel drive was 92 per cent. efficiency,

while in Germany a certain factory was turning out continuously a worm drive in which an efficiency of 98.25 per cent. was secured steadily.

The next paper to engage the attention of the members was the one on non-poppet-valve motors, by J. B. Hull. This paper was read to those assembled by the author and provoked a quantity of discussion in which nothing new was brought to light. The paper was a résumé of all the prominent types of sleeve and rotary motors now on the market. Mr. L. B. Brown spoke against the non-poppet-valve, stating that the added silence did not have the importance which had been given it. He added that, while a non-poppet-valve motor could probably turn over regularly at the smallest speed at which the flywheel would compress the charge, there was no advantage to this, since a driver in a crowded street would keep his engine in high gear, whereas a driver in the country would not care to run at the minimum speed. Mr. Brown further stated that the cost of repairs of the non-poppet-valve in such cases as neglect of lubrication was much greater than the cost of repairs on engines of the poppet type. Mr. C. S. Goby remarked that he believed the increased valve area of a sleeve-valve motor would result in an increase in power. This would be greatly to the advantage of this type. Mr. Souther took up the discussion here and gave it as his opinion that a good, quiet poppet-valve motor was a hard thing to surpass, and that after all the matter was that of the survival of the fittest.

### Non-Poppet Valves Briskly Argued

Mr. J. G. Perrin in connection with the question of silence of the non-poppet stated that in his opinion silence was obtained in a number of cases with non-poppet motors at the expense of very necessary features. Herbert Chase contended that a great advantage was obtained in the shape of the combustion space in the non-poppet motors and furthermore that the cost of manufacture would not be high after the tools had been developed. Another great advantage, in the opinion of Mr. Chase, was the flat torque curve of the non-poppet motor.

The lengthy paper by Chester S. Ricker on Silent Chains was not read, the author confining himself to calling the attention of the members to the errata which were discovered after the paper had gone to press. Further corrections were then offered by Louis A. Hill, who also stated that, in his opinion, the information offered on page 47 of the paper is dangerous. The Renold Company is quoted as stating in its bulletin on camshaft drives, January, 1911, the different sizes of chain to be used on motors of given sizes. Mr. Hill pointed out the fact that conditions vary to such a large extent that it is impossible to lay down any set of rules which would cover every condition. He also stated that adjustments must be provided where the chain is in contact with more than two gears.

### British Restrictions Discussed

H. F. Donaldson, a member of the party who made the foreign trip, stated that the chain gearboxes used on the London buses was of especial interest to him, as the General Omnibus Company adopted what was thought the best possible thing without caring much for appearances. This concern was at first greatly taken aback by the requirements of Scotland Yard, which seemed impossible to live up to, but it was found that, with the use of a little ingenuity, all the provisions made by the authorities could be readily observed. The chain gearbox has been universally adopted by this concern and has given great success under the very rigorous conditions imposed.

Mr. Hill spoke on the advantages of the split-bushed link, stating that a higher grade of strip material than rolled could be procured. Greater accuracy is also obtained by wrapping the strip material, while the cost of assembling is lessened. The fact that grit interferes seriously with the life of the chain was brought out by several of the members, who cited examples of this. The fact that centrifugal force does not interfere with the pitch was also brought out.

## Night Session Devoted to Commercial Vehicles

VARIOUS phases of commercial vehicle manufacture and construction occupied the attention of the engineers at the evening session. Charles B. Whittelsey opened the discussion by reading his paper on the Mechanical Points in Connection With the Construction of Solid Motor Tires. He brought out the fact that solid motor tires can wear away and suffer as much from misuse as pneumatic tires, and stated further that the misuse to which they are generally put is largely due to the fault of the manufacturers in not educating users to an appreciation of the tremendous difficulties that have been surmounted in bringing them to their present state of efficiency. A brief historical review of the solid tire was then read, after which its construction, size and shape, life, troubles, standardization and other of its salient features were taken up.

No points of interest were brought out by the discussion of the solid tire situation which followed.

A paper which dealt with the Increasing of the Utility of Commercial Cars by Auxiliary Loading and Unloading Devices was next ably read by its author, E. W. Curtis, Jr. He stated that, with the increasing sale of motor trucks, the demand for auxiliary loading and unloading devices has developed a variety of contrivances, good, bad and indifferent, which are to be obtained readily all over the country. In his opinion, however, expert discrimination is generally required to correctly select and adapt the proper vehicle to the work in hand. The uses to which dumping bodies, quick loading hoppers, cranes and the like are put in large commercial organizations were mentioned. In his conclusion he said that the employment of new devices and new uses for the ones now extant will unquestionably increase the utility and sale of motor trucks, and should be given all the publicity possible. There is excellent opportunity for the ingenious engineer who will devise new means of loading or unloading truck merchandise and he should have in mind that the power plant of the truck may be utilized to good advantage, according to Mr. Curtis.

Mr. Bailey was of the opinion that the majority of the large New York houses have too many other considerations to deal with at the present time to bother with crate or other forms of special unloading bodies. This was true in his own case, at least, he said.

### Baker Urges Continuous Use

Continuity of action of trucks, that is, keeping them going, is very important in the view of Mr. Baker. He made mention of one instance where a concern used a number of 1-2-ton trucks of uniform size with interchangeable bodies very efficiently, and stated that the whole situation narrowed down to a question of individual loading with interchangeable units.

In the opinion of Mr. E. R. Whitney, unloading and loading devices are a vital factor in the truck situation.

A few concluding remarks were then asked from Mr. Curtis. Among other things he said that the opposition to loading and unloading devices was due in large measure to the attitude of the old-line shipping clerks, who were either unable or were too obstinate to consider new delivery plans. He reiterated Mr. Baker's remark that trucks must be kept moving to be a success.

The paper on Motor and Transmission for Commercial Cars by Mr. E. P. Batzell was not read. Mr. Souther touched on the principal points of the article as brought out by its author. It shows that the average truck motor need not be very large, and also brings out that the motor speed should be about 800 revolutions per minute. The chairman noted that this speed was about twice lower than present practice. The paper further discusses the subjects of fuel economy and power required, to-

gether with the relative cost and details of operation economy.

Mr. C. T. Myers remarked that the tendency was toward the use of smaller motors and moderate speeds around 1,000 revolutions per minute. The problem is almost entirely one of transmission design and fuel economy, he said. In the constructions with which he was familiar the transmission was designed from the low gear as a basis, the higher ratios being made to conform to that. Incidentally, he made mention of the fact that the White truck motor is smaller than any other made in this country.

The electric truck has a bearing on the subject, according to Mr. J. G. Perrin, who explained that the gasoline motor must be made larger than the electric motor for the same service, since its overload capacity is very much less. He was of the opinion that the tendency is for larger truck motors than necessary.

### Guarantee Question Important

In connection with the selling of trucks, Mr. Myers stated that the matter of the guarantee was very much of a mooted question. He advocated the adoption of standard truck specifications, to which salesmen should be instructed to adhere rigidly. A standard test hill up which each truck should be driven under full load, the efficiency of the machine being based on this performance, was suggested. This would largely do away with the confusion now experienced due to the widely varying and sometimes impossible performance claims made by salesmen for purely selling reasons, he thought.

Customers' ideas differ as to the meaning of the phrase which involves speed and mileage, and it should be clearly explained to them, Mr. W. H. Conant said. He also made mention of the fact that this same standardization idea was brought up by himself a year ago, and that at that time it received very little consideration.

In the view of Mr. F. E. Muskovich, this discussion referred back to a paper by Mr. Kennedy at Dayton, in which the salesman element was brought out and illustrated by one particular instance where one identical truck was guaranteed to two different customers to go at speeds of 30 miles and 12 miles an hour, respectively.

As Mr. W. P. Kennedy had unfortunately contracted a cold, making it impossible for him to speak, the reports of the Committee on Standards Recommendations, of which he is chairman, were read by Mr. Souther. The first of these was a report of the Truck Standards Division in which the progress of the committee was set forth.

Since Mr. H. F. Donaldson is a member of this body, he was called upon to speak on the work. He reiterated the statements made in Mr. Kennedy's communication, and promised accumulated data at the next meeting. Progress had been rapid, he said, due to the surprising unanimity of opinion of the members.

The other Kennedy report, that of the Wheel Dimensions and Fastenings for Tires Division, dealt with the various limits of tolerance in connection with wheel dimensions. After correcting a typographical error which was brought to the attention of the members by the remarks of Mr. Firestone, this third report of the division was accepted.

Then followed a report of the Commercial Vehicle Division of the First S. A. E. European Visit, several papers being read by its members.

The first of these dealt with the Marketing and Use of Light Gasoline Vehicles in Europe, and it was read by Mr. A. B. Cumner. He stated that there was no standardized product on the other side, each customer insisting on radically different



specifications. In most cases, he said, a customer's order was large, and therefore the manufacturer could afford to make up the machines in accord with his views. There is no service for the owner of the single vehicle, unless he happens to possess one similar to those owned by a large user of the machines who has a private garage devoted exclusively to their repair and maintenance, and where he can have work done. The delivery methods of several of the larger London concerns were outlined, tending to show the efficient systems which have been adopted. Two men are usually placed on each truck or delivery car, one devoting his time exclusively to driving and the other to the delivering of the goods. Each car is remanded to the garage for two days in each month, during which time it is thoroughly inspected and overhauled. The driver remains with the car as a helper, and in this way becomes familiar with the truck which he operates. Premiums and penalties for running and repair cost are found to work well and to reduce tire wear.

The use of experienced drivers was advocated, as well as the fact that the salesman should not overrate the capabilities of the truck which he is selling. Rather, the customer should be educated to the car's limitations.

#### British Commercial Design

The Trend of English Design was next discussed by Mr. B. B. Bachman, who took occasion to commend the hospitality which had been extended to the members abroad. The need for the development of small light vehicles was discussed, and average practice was outlined. He stated that the motor is usually placed under the hood in front, bodies overhang to a great extent, pneumatic tires are not placed on cars of more than 1-2-ton capacity, two-cylinder and four-cylinder motors are found in about

equal proportion and that worm drive is predominant. The manufacture of these worm drives was then briefly taken up. The worms are usually made of steel, while the gears are of bronze, he said.

A paper on the Worm and Gear as the Ultimate Drive Applied to Heavy Power Vehicles, which was deferred from the morning session owing to the absence of its author, was then gone over by Mr. R. H. Rosenberg, who brought out its high lights. He brought out results obtained from exhaustive experiments on the worm drive and stated as a result of these that he believed the worm gear to be the most logical means of reduction, especially for truck construction. The question of cost was next discussed, Mr. Rosenberg stating that he considered the worm gear the cheapest form of final drive when properly constructed. Concerning the durability of this form of gear, he added that he had inspected gears after they had been run 120,000 miles and found them in excellent condition.

Steel Wheels by Mr. A. J. Slade was the concluding paper of the evening. Among other things, he mentioned that steel wheels cost 80 per cent. more than wood ones in the United States, while an equivalent set of wood wheels in England cost 120 per cent. more than they would here, which considerations probably account for the steel type there and wood in this country. The tendencies in wire wheel construction abroad were outlined, and it was also mentioned that some of the English manufacturers adhere to the wood type. Mr. Slade further said that life of the tires was not materially affected by the use of either wire or wood wheels, although it is generally conceded that the wear is the greatest with the former. He was also of the opinion that, all things being considered, wood wheels are better adapted to the United States.

## Muskovics' Magneto Paper Featured Fourth Session

THE fourth session of the eighth annual meeting of the Society of Automobile Engineers was occupied with the reception and consideration of one formal report on magnetos by F. E. Muskovics and by the reports of five divisions of the Miscellaneous section of the general Standards Committee. Chairman A. L. Riker of the Miscellaneous Division was reported ill and the presentations of the reports were made by Morris A. Hall.

With regard to the suggestion by the Board of Combustibles that a fusible plug be provided for gasoline tanks on all automobiles stored in garages, which was withdrawn by the board and subsequently supplanted by several recommendations covering the same grounds, Mr. Hall reported for one of the subdivisions that the installation of a safety valve on top of the gasoline tank, set to blow off at approximately one-tenth the bursting pressure of the tank, would be much preferable to fusible plugs.

Mr. Souther stated that it had been his observation that explosions did not occur within gasoline tanks and that where fires have happened that destroyed tanks filled with gasoline the tanks had been opened out with an action similar to that of expanding steam.

It was pointed out that, if the fusible plug suggested should be adopted and should be located in the bottom of the tank, excessive heat would not serve to open the tank because the gasoline itself would prevent the melting of the plug. If the plug could be opened, it would only serve to allow the gasoline to run out onto the fire.

If the plug were placed on top of the tank and should be burned out, all the gasoline in the tank would rush out in the form of combustible gas, adding to the danger of the situation.

Mr. Trego put forward the idea of locating a pop-valve on the air line, preferably as far away from the tank as possible and acting on a pressure of 2 pounds.

Mr. Fergusson agreed with the terms of the report and sec-

onded its passage. Mr. Muskovics, Mr. Pope and Mr. Hall made suggestions as to the degree of pressure at which the pop-valves should be set and with regard to the brazing and riveting of the seams, and Mr. Souther moved as an amendment to the report submitted that metal gauze coverings be installed over the openings in the tanks to prevent striking back.

Mr. Muskovics closed the discussion with a suggestion that when the report was received it should only be considered as marking a stage in the development of the safety idea, and the report was unanimously adopted.

#### Two Sets of Magneto Specifications

Mr. Muskovics then presented the report of the Division of Magneto Dimensions. He put forward two sets of specifications; one for motors having a bore of less than 4 1-2 inches and the other for motors with a greater bore. He stated that the committee had taken the specifications of a well-known maker of magnetos and amended them in overall length so as to take in all the other standard makes.

Mr. Heald said that there was a distinct need of standardization in regard to magnetos and that it was not quite apparent to him why two sets of specifications had been included in the report.

This precipitated a wide debate in which practically all the American magneto makers took part. It appeared that the taper used in six-cylinder magnetos was larger than in four-cylinder cars. The report did not cover the phase of magneto development represented by the automatic advance of the spark.

They all agreed that the ideal condition would embrace only a single set of specifications, but it was stated that a change at this time from the double or triple set was impracticable.

H. L. Pope moved the adoption of the report, including instructions to the committee to continue its work and to particularly include an investigation of the variance in the tapers and

the progress in automatic advance. The report was adopted.

Mr. Hall then presented the report of the sub-committee on Electric Lighting Outfits, which was referred back for more data on base dimensions.

In the report on oversized cylinders, also presented by Mr. Hall, there was a lively discussion. The report recommended that two oversizes be recognized by the society in its standard specifications, respectively .02 and .04 inch, to cover cylinders after being re-ground and also those that were originally over standard size.

It was argued by numerous members of the society that .02 was too much metal to be removed in all first grindings and that .04, as an outside limit, might prove too little in case of multiple grindings. The sense of the meeting was that a more flexible scale should be adopted and it was moved that the report be amended to contain specifications of four standard oversizes, namely: .01, .02, .03 and .04 inch. The report was accepted.

### No Change in Spark Plug Tolerance

Mr. Hall also presented the report on bushings for rod and yoke ends. Originally the intention was to make this report broader than it was in its final form, but on motion of Mr. Alden the significance of the report was narrowed to include only the space for bushings in the eye of the brake lever. There was much debate on this report and eventually it was adopted, simply as an amendment to previous action of the society.

Spark plug thread tolerances occupied considerable time in presentation. The standard specifications of the society provide for a diameter of .875 or 7-8 inch for spark plugs and the matter before the meeting was largely as to the method to be used in measuring the plugs.

Mr. Mosler said that the spark plugs on the market measure from .835 to .875 inch.

Mr. Fergusson said that in case a spark plug is materially smaller than standard there is an excellent chance to strip the thread in the cylinder, an exceedingly costly performance. He said that if a tolerance of .003 inch was allowed between the spark plug and the hole, the tolerance recommended formerly by the society, there would be little dissatisfaction.

The meeting was not prepared to advocate a change in the tolerance and the report was sent back to the committee for additional investigation as to methods of measurement.

The feature of the session was the report on the importance

of the consideration of the magneto in relation to engine design, by Fred E. Muskovichs.

Mr. Muskovichs covered five subjects in his presentations. These were: Proper location, accessibility, accurate alignment, location of control levers and proper wiring.

Under the first head he said that precautions should be taken to place the magneto so that it would be protected from oil, gasoline and engine discharges. In motors where the carbureter is on the same side as the magneto he called attention to the dangers of disastrous fires through the carbureter flooding directly upon the magneto and by the collection of waste gasoline near the sparking apparatus.

On the second head he said that great care should be taken by engineers to see that the parts of the motor necessary in proper timing should be accessible, particularly the universal joint and the breaker box. He recommended that the magneto drive be on the same plane, horizontally, as the crankshaft and if possible even higher, which would bring the breaker box into full view.

With regard to the alignment of the mechanism, he said that it was a prolific source of trouble on account of improperly designed joints or improper machining of the magneto base or both. Not only do such faults result in noise, but they also lead to the breaking down of the bearings supporting the armature shaft, especially in ball-bearing magnetos. In this division he also called attention to the necessity of using non-magnetic metal in the magneto base and fastenings and the absolute necessity of seeing that the magneto is separated from electrical connection with the engine base.

As far as the control levers are concerned, Mr. Muskovichs said that their arrangement is purely a matter of mechanics. He called attention to the fact that these arrangements are often left to inexperienced men, with the result that undue strains and stresses are frequently placed upon the breaker box. He said that the subject deserved much more care than it had been given.

With regard to wiring, he urged that it was important to carefully segregate and insulate primary wiring, if for no other reason than that it takes a long time for such wiring to give trouble, but, when it does, such trouble is about the hardest to locate of any of the ills to which a motor car is subject. He urged short wiring.

At the conclusion of the report the society applauded Mr. Muskovichs and in the discussion representatives of the chief magneto companies commended the speaker for his conciseness.

## Report of Broaches Division Caused Much Discussion

THE paper by Forrest A. Heath engaged the attention of the members of the S. A. E. for the early part of the afternoon meeting. This paper, on the constancy of gasoline diffusion, the homogeneous carbureting of air, and the evolution of some practical method of introducing same into the fuel generating apparatus of motor vehicles, provoked a great deal of miscellaneous discussion on homogeneous carburetion. One of the leading questions on Mr. Heath's paper was propounded by Mr. Butler, who requested information regarding the effect of the carbureter water jacket on the grating over the helix. Mr. Butler brought forward the point that the globules of gasoline coming into contact with the heated metal would be vaporized very rapidly. An additional query which was also of great interest was in regard to the size of grating employed in the experiments and if this grating was all of the same size.

When Mr. Heath had concluded reading his paper he stated that in spite of some of the broad claims made by many it was generally understood by those who were acquainted with the facts that the modern carbureter, although a very wonderful piece of mechanism, did not in any case give the highest possible results at all speeds. It was Mr. Heath's claim that the use of the helix would produce an increase in power of 250 per cent. in the

motor when that motor was running in the car and not on blocks. The structural complications of the newest types of carbureters were also claimed by Mr. Heath to have a very deleterious effect on obtaining the best results. Mr. A. J. Myers made queries along the line of the effect of the helix on the condensation of the gasoline. Mr. Heath's reply indicated that he had obtained fully 50 per cent. less condensation when using the helix and that this conclusion had been reached by the employment of a glass intake pipe in which the results could be very readily noted. It being then rather late it was decided to take up the report of the Broaches division.

### Committee Puts Questions

The second report of the Broaches division of the Standard Committee was then taken up. The Broaches division had decided to put the leading questions before the members to be threshed out in open meeting. The questions and the decision of the members follow:

Question 1—Shall multiple-spline holes and broaches be made to one standard, regardless of whether the fitting is to be made on the large diameter or on the small diameter; proper allowance being made on the shaft by the individual designer, for



machining for the required fit? This proposition has many advantages, including simplicity, minimum number of broach sizes to be carried by both manufacturer and tool maker, and makes possible the adoption of certain important propositions which are easily remembered, such as: Width of key equals one-fourth small diameter of shaft; height of key equals one-half the total width.

It was moved and carried after a large amount of discussion that multiple-spline holes and broaches be made to a standard.

Question 2—Shall the sides of the key be radial or shall they be parallel?

The discussion on this question hinged largely on the life of the teeth and the cost of manufacture. The balance favored the parallel teeth by just a shade, although a compromise between the two was suggested by Mr. Lapointe. It was finally decided that the parallel-sided tooth should be endorsed.

Question 3—Shall there be any radius at the corners of the keys?

The consensus of opinion on this subject was that it was of slight moment, the decision being in favor of the rounded corner.

Question 4—If question 3 is decided in the affirmative—shall the size of radius be different for each size of shaft; that is, be proportional to the size of shaft as recommended in the foregoing report, or shall it be made an arbitrary, minimum practical

size, as for instance, .015 inch for all sizes up to and including 1 1-2 inch small diameter of shaft, and .025 inch for larger sizes up to 3 inch small diameter of shaft?

#### Arbitrary Radii Adopted

It was immediately moved and carried that the curvature should be .015 for all sizes up to and including 1 1-2 inches small diameter of shaft and .025 inch for larger sizes up to 3 inches small diameter of shaft.

Question 5—Shall the key of the 4-splined and 6-splined shafts be the same, or shall the circumference of the shaft be nearly equally divided in each case? The key sizes recommended in the foregoing report approximately equally divided the 6-spline, but not the 4-spline.

A tie vote resulted on this question and it was referred back to the committee.

Question 6—Shall one standard of sizes as regards height of key be adopted for permanent fits and fits not required to slide while under load, such as transmission gears, and another standard of sizes for fits required to slide while under load, such as the slip joint in the propeller-shaft?

There was little discussion on the last question, and in order to bring the matter to a head it was decided that the variations should be made in the shaft instead of in the spline.

## Annual Banquet at Astor Was Well Attended

THE annual banquet of the Society of Automobile Engineers, which took place in the Hotel Astor, was attended by over 330 members and guests and proved to be the most interesting event of its kind in the history of the society. The number attending was slightly in excess of a year ago, and it would have been much greater had it not come so near the end of the show period in this city, many of the members having left the city to attend the Philadelphia show and to get exhibits in readiness for the Chicago show.

A commendable departure in the dinner this year was the presence of half a dozen speakers who filled in the time after the dinner proper was over, the addresses being a big improvement on the vaudeville entertainment of former years. President Henry Souther, who formally retires from office at the completion of the present session, in his toastmaster address, reviewed the year's work of the engineers, chiefly that portion of the activities relating to the work of the general standardization committee and its various sub-committees.

"This is to be," remarked Mr. Souther, speaking of the S. A. E., "one of the most influential technical institutions in America, if not in the entire world. In my judgment, no more stalwart organization of men can be found in the country. Take the work of the standards committees: A little over a year ago there were over 1,100 different sizes of steel tubing and today we have but 150 different sizes. These 150 answer all requirements of the motor car field with the exception of the extraordinary cases.

"One manufacturer of gearsets recently stated that he did not think there was much in the S. A. E. for him, that it did not concern his line of manufacture, and there was not any reason for his being interested in the work. His main idea was that he had to supply parts to suit his customers and that the work of the S. A. E. would not help him in this. When it was pointed out to him that his various customers have the S. A. E. data books before them and that they specify standard parts for their gearsets, he readily saw that the work of the society was specially vital to him and that he could not afford not to be a member.

"In the lock washer division there were over 700 different shapes and diameters in use in the car trade. Today there are but thirty-two, and every requirement can be met as well with these thirty-two as with the 700.

"The standardizing of wood wheels for trucks has brought co-operation among the rubber men, the wheel makers and the man buying the truck. Several business houses, now using trucks and in the market for more, have written the society, stating that they will not purchase trucks which have not the standardized wheel sizes. With the standardized wheel size it is possible to fit different makes of tires, where at present to change the make of tire in some cases means buying new wheels also, which in itself is a considerable expense.

"The standardizing of annular ball bearings has been brought to a satisfactory stage, so that if an engineer specifies No. 212 he knows what he is going to get and the bearing maker has not to put through special lines for him. Magneto bases and couplings are now so standardized that a car owner can change his make of magneto without any trouble as to fitting on the end bedplate or coupling to the driveshaft. Fully 98 per cent. of the magnetos are now made to standard size.

#### Souther Praises Standardization

"Good progress was being made with the standardizing of electric light parts, such as lamp-voltage, lamp-bases, etc. The advent of the self-starter has upset this entire matter and new work will have to be carried out. Good progress is being made with carbureter flanges. Today to change the make of carbureter often means to get a new intake manifold. This should not be. The adoption of standard sizes of flanges would make the change of a carbureter as simple as that of the magneto. This also applies to the water connections for the carbureter jacket.

"There are some things that are standard and some that cannot be standardized, such as gearset quadrants, and while the society has not taken the liberty to set definite standards, it recommends certain standards which the engineer may follow. The fire underwriters are now becoming very acute on motor cars, and the society has taken up the matter of safety gasoline tanks, using a safety gauze in gravity flow tanks and a safety valve for pressure-feed systems. These are meeting with the approval of the underwriters.

"The steel makers have at last gotten together in the work of a final compilation of specifications for the different carbon and alloy steels. A ready-reference kind of nomenclature has been adopted in which carbon steels, nickel steels and



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chrome-nickel alloys have their specifications partly indicated in the title of the specification. The 10 series is for carbon steels, the 20 series for nickel steels and the 30 series for chrome-nickel steels. Thus, 23-20 means nickel steel with 3 per cent nickel and 20 points carbon; 33-50 indicates a chrome-nickel steel with 3 per cent nickel, 50 points carbon and the proper percentage of chromium. In addition to adopting this nomenclature, the revised specifications of steel, iron and aluminum cover every possible case that may arise. These specifications will be revised from year to year. Spring makers have made good progress in their work, as also have those who have the sheet brass field."

#### President Donaldson Cheered

H. F. Donaldson, president-elect, was hailed with continuous cheers when he was introduced by the toastmaster. His remarks consisted of reminiscences of the European trip of over forty members of the society during last November and December. In speaking of English hospitality, he said: "From the time we reached Liverpool we were in the hands of our friends who escorted us to London, and, although trains were six hours late, the reception committee waited at the Euston Station until the engineers arrived. This same hospitality continued throughout the entire visit." In speaking on the general field of usefulness of the S. A. E., the president-elect mentioned the possibilities of friendship in the organization, which are greater than in any other organization in the motor car field today. This business friendship is a permanent investment to every member. No memory of the European trip was fresher than that of the friendships established while the tourists were on the other side of the ocean.

E. T. Birdsall spoke of the early days of the society, giving some facts relative to its inception with but five members the first year, and few additional the second year. Today the membership is almost 1,200, and there are thirteen applications for membership before the council and sixty-seven others which have not been reported on as yet. Other speakers were R. M. Lloyd, member of the society, and one of those who made the foreign trip; F. R. Hutton; T. C. Pelling, representative of the Arrol-Johnston interests, a Scotch car-building firm, and H. C. McCormick, representative of the Wolseley-Siddeley Company, who is at present in America studying methods of manufacture. Among those present were:

Mr. Acker, H. W. Alden, L. B. Alexander, Retiben Allerton, R. M. Anderson, J. A. Anglada, C. A. Anthony,

B. A. Bachman, R. A. Bachman, R. S. C. Bacon, Russell C. Ball, E. P. Batzell, H. A. Baxter, E. W. Beach, W. G. Bee, David Beecroft, H. B. Bent, C. A. Besam, B. M. Beskow, Joseph Bijur, E. T. Birdsall, F. R. Blair, F. M. Blair, L. H. Bowman, R. F. Bowtell, G. K. Bradfield, George C. Brainard, J. S. Bretz, E. T. Brinegar, A. E. Brion, Frank Briscoe, E. E. Britigan, M. Britton, H. H. Brown, L. B. Brown, William H. Brudi, T. V. Buckwalter, H. A. Bugie, Frank Burgess, D. J. Burns.

L. C. Carlton, George S. Case, W. D. Case, F. E. Castle, A. Champion, H. W. Chapin, J. C. Chase, C. F. Clarkson, C. E. Clemens, H. E. Coffin, W. L. Colt, W. H. Conant, F. E. Couch, C. D. Cramp, Charles Crawford, George C. Crittenden, Kenneth Crittenden, J. A. Crowley, A. B. Cumner, H. F. Cuntz, E. W. Curtis, Jr., R. B. Curtiss, W. C. Cutler, F. F. Cutting.

P. H. J. Daly, P. J. Dasey, H. L. Davisson, A. M. Dean, E. A. De Waters, R. E. Dexter, W. F. Diefendorf, W. C. Dodd, H. F. Donaldson, A. J. Doty, L. L. Driggs.

F. L. Eberhardt, A. H. Ehle, Burton G. Ellis.

W. E. Farrell, T. J. Fay, David Fergusson, A. J. Fisk, J. W. Fitzgerald, C. W. Fletcher, R. W. Funk, F. G. Fromm.

E. C. Gerther, Germane F. M. Gibney, James L. Gibney, Christian Girl, A. R. Gormully, William Gray, G. A. Green, A. A. Greenburg, G. H. Grundy, E. R. Gurley.

M. A. Hall, H. D. Haight, A. P. Haines, W. H. Harris, E. V. Hartford, J. A. Hartford, C. W. Hatch, C. B. Hayes, J. N. Heald, F. A. Heath, J. S. Hegeman, O. Heins, Thomas J. Heller, M. Hendrickson, J. M. Hertzler, Henry Hess, A. G. Hoffman, Walter Holland, J. H. Horn, J. W. Horr, H. A. House, Jr., J. C. Hoyt, L. D. Hubbell, Russell Huff, F. G. Hughes, J. B. Hull, A. H. Humphreville, S. V. Hunnings, M. R. Hutchison and F. R. Hutton.

P. E. Jackson, Stephen Jencick, J. J. Jennings, Lamson Jennings, Walter M. Jones.

Leonard Kebler, F. G. Kendall, W. P. Kennedy, Harry H. Kerr, W. P. Kidder, F. B. Kilgore, G. A. Kissell, V. W. Kliensrath, Louis Krynitz.

V. E. Lacy, W. M. Ladd, E. F. Lake, J. N. Lapointe, R. R. Lapointe, F. W. Lawrence, J. H. Lehman, L. Lehmann, T. J. Leonard, R. McA. Lloyd, Allen Loomis, M. T. Lothrop, E. M. Lowry, C. E. Lozier.

C. H. McCausland, D. A. McConnell, C. A. McCutcheon, Albert McDonald, W. S. McDonald, E. B. McDuffee, J. C. H. Machen, J. M. Mack, L. C. Marburg, Theodore H. Marburg, G. L. Markland, Jr., C. H. Martin, F. L. Martin, A. F.



Masury, John E. Matson, John A. Matthews, M. L. Matthews, Harry Maxson, J. F. Merkel, C. H. Metz, A. R. Miller, C. H. Miller, J. A. Miller, D. K. Moore, C. J. Moore, T. J. Moore, F. H. Morse, William B. Moses, A. R. Mosler, C. S. Mott, T. E. Mudd, C. T. Myers, A. J. Myers, F. E. Muskovichs.

E. C. Newcomb, R. M. Newhold, R. T. Newton, Lars G. Nilson, G. L. Norris.

Charles Oppe, H. S. Otto, F. W. Owen.

E. J. Parsons, E. S. Partridge, J. G. Perrin, W. J. Perry, Mr. Peters, K. Franklin Peterson, F. F. Phillips, W. B. Pickup, A. J. Poole, Frederick H. Poor, Harold L. Pope, N. B. Pope, Richard Prosser, Thomas Prosser, J. C. Pullinger.

Hugo S. Radt, R. H. Randall, Robert W. Read, O. P. Redford, Chester S. Ricker, A. L. Riker, Elmer R. Ritter, M. H. Roberts, Arthur W. Robinson, Frank W. Roche, J. F. Rodarmor, John R. Rogers, Ralph H. Rosenberg, Edward A. Ross, D. E. Ross, E. F. Russell, R. F. Russell.

N. S. H. Sanders, Ralph Sanger, F. S. Sayre, Joseph Schaeffers, Otto W. Schaum, Alex Schwalbach, C. L. Schwarz, John D. Scott, Frederick W. Seaman, J. B. Sessions, Mr. Shanks, W. C. Shepherd, Charles L. Sheppy, G. F. Shore, R. A. Shriller, A. J. Slade, S. S. Slater, A. P. Sloan, Jr., Paul L. Snutsel, Henry Souther, H. L. Spohn, E. H. Stern, Albert I. Stevens, G. W. Stiger, Harry M. Stillman, W. H. Stillwell, A. W. Stone, C. E. Stone, Robert G. Stranahan, Mr. Stranahan, E. O. Sutton, George P. Sweet, H. M. Swetland.

F. W. Thomas, Milton Tibbetts, T. E. Tomlinson, W. W. Totman, H. L. Towle, Thomas Towne, F. W. Trabold, Joseph Tracy, C. A. Trask, F. Treuffert.

N. H. VanSicklen, Jr., G. W. Vaughan, Louis Vogel.

George Wadsworth, E. A. Wales, F. H. Wallace, A. Waterman, E. R. Waterman, Jay G. Weiss, George W. Wesley, Lawrence Whitcomb, C. E. Whitney, E. R. Whitney, C. B. Whittelsey, W. W. Wiend, John Wilkinson, J. E. Wilson.

## Professor Hutton Discusses Motor Vibrations

THE opening paper on the morning of the third day was on the subject of gas engine balance, by Ernest R. Fried. The subject was treated in a highly mathematical way by the author and so thoroughly were the points explained that the resulting discussion was more in the nature of sidelights on the question than anything in the way of addition to the subject matter. Professor Henry Hutton, who has been doing some testing work at the laboratory of the Automobile Club of America, on motors for aeronautic purposes, showed the arrangements made at the club for referring the vibrations of the motor in an up-and-down motion to some plane which would be fixed in this direction and free from the influences of the vibration of the walls and the ceiling. This device consists primarily of an I-beam which extends across the room. A platform is fixed to this and three heavy springs which suspend a weight of 150 pounds. From the latter weight there are three other springs which suspend a casting weighing 50 pounds. With this apparatus it is found that vibration is absolutely eliminated in the lower weight. Mr. Fried questioned Professor Hutton as to whether he had ever tested a two-cycle motor on this apparatus and noticed the severe rocking effect given by this motor. He also stated that with this type of motor, which he believes to be the coming type, these vibrations are the chief obstacle to its progress. Experiments had not been performed by Professor Hutton on any motors of this type. In response to a query put by Mr. Brown as whether any experiments had been performed on the V-type of eight-cylinder motor Mr. Fried replied that the same mathematical method as had been applied in the case of the vertical type of four-cycle motor could be successfully applied.

Before further papers were taken up, President Henry Souther spoke of the courtesy of the Board of Trade, to whom they were indebted for the meeting place in the Garden as well as the exhibition space where the first public display of the work of the society was made. Professor Henry Hutton moved a vote of thanks to the Board of Trade and this was unanimously carried. Mr. Muskovichs then proposed a vote to extend the condolences of the Society to Mr. Patrick Hussey who has been stricken totally blind. This was also unanimously carried.

Extracts from the paper on automatic spark control, of which Lon R. Smith is the author, were then read by Secretary Clarkson. Several of the statements in this paper were objected to by various members. The author states in his paper that expensive self-starting devices can be done away with if the automatic spark advance is fitted. This, as Mr. Muskovichs stated, was not necessary to comment upon, as it was obvious that the claim was slightly overdrawn. Another objection was offered to the statement on page 5 of the paper that there is but an inappreciable time between the beginning and end of combustion.

This the author himself disproved later in the paper, according to Mr. Muskovichs, who stated that there is an appreciable time and one which may be readily calculated and which was taken into account in all timing calculations. This same gentleman went on to say that the automatic spark advance cannot be taken as the cure-all for motor troubles, as there are certain important features which the automatic advance does not take into account. Engines running at the same speeds will require different timing which will depend very materially on the load on account of the inertia of the gases in the intake manifold and the different speeds of flame propagation due to the varying richness of the mixture. The discussion which followed brought out the general opinion that the automatic advance was a good thing in the hands of the average chauffeur, although it was conceded that an expert driver could get a little more from his motor by having control of the spark advance.

### Discussing Automatic Spark Advance

A point offered by Mr. Brown was to the effect that it was very seldom that a driver ran at a speed of less than 14 miles an hour on the high gear and that when such was the case he generally dropped to a lower speed so that the motor speed did not vary to such an extent as was often supposed. At the same time in his opinion the spark position depended to a much larger extent on the throttle opening than it did on the speed of the motor. The difference in the rate of flame propagation at night, when the oxygen in the air is greatly in excess of what it is on a warm day, was brought out and taken as an example to show how the spark advance would have to be altered under such circumstances to produce maximum power. Some amusement was caused by Professor Hutton's remarks on the position of his heart (in his throat) while ascending certain mountain slopes in the Catskills and his remarks to the effect that this fear would be materially increased if he had an automatic spark advance under such circumstances. The general tenor of the Society's discussion, however, was to the effect that while a skilled driver could get more power from the car with a hand-controlled spark, the average chauffeur was not willing to go to the trouble to find the best position even if there was an extra expenditure for fuel.

On the report of the carbureter division, a few corrections were offered and immediately accepted without controversy. The flanges on the 1 1-4, 1 1-2 and 1 3-8-inch sizes were changed from 5-16 to 3-8 and in the 1 3-4 to 2 1-2-inch sizes the flanges were changed from 3-8 to 7-16 inch. Several other minor changes were recommended and passed, but it was decided that the report should not be adopted until it was verified by further experience. The matter has been passed over to the summer session, as it was too important to make a hasty decision.

The paper on self-starters for motors did not bring forth any new theories as the author, J. W. Fitzgerald, merely confined himself to a review of the starters on the market at the present time. These were classified and the points of advantage and disadvantage of each were brought out in an impartial manner. After the paper had been read by Mr. Sweet a discussion was called for by the chair. The most interesting point was brought out by Mr. Muskovich, who had noticed marked signs of stratification in the motor cylinders when acetylene was used. It was noticed that, when the acetylene was forced into the cylinders and the spark thrown on, the motor did not start, but when the operator left his seat and walked to the front of his car for the purpose of turning the starting handle the motor started before he could reach it.

#### No New Points in Self-Starter Paper

Mr. Hubbell stated that an electric starter in order to be a success must be built in the motor and not applied after the

motor has been built. He also stated that it was the case that as many as seven movements were required to operate some of the self-starters and that in the same length of time and with the same amount of trouble the operator could have turned over the crank of the machine and started it by hand instead of using the starter at all. The general attitude of the society seemed to be that they were all watching the development of the self-starter question and that they were looking for a simple, cheap and reliable system that would not only start the car just after it had stopped running, but after it had been standing for a week in a cold climate.

The report of the Frames Section Division of the Standards Committee was then submitted for discussion. There were enormous difficulties in the way of this committee adopting standards for frame sections on account of the greatly varying practices among the different car makers. It was moved and carried that this matter be referred back to the committee for further study and taken up again at the next meeting of the society.

## Very Short Session Marked the Wind-Up—Summary

THE report of the Springs Division of the Standards Committee was next taken under consideration. This subject was also found a difficult one to standardize, owing to the vast differences in practice. The subject matter was departed from, to a certain extent, when the members of the society took up the matter of the position of the spring shackles. This discussion was precipitated by Mr. H. L. Pope, who stated that there was an error in the cuts of the spring divisions reports, as the positions of the shackles on some of the springs were shown to be at an angle to the vertical instead of being vertical. Mr. David Landau stated that in his opinion the shackle could be absolutely ignored and that it made no difference at what load the shackle assumed a vertical position so long as the designer furnished the proper dimensions to the spring maker. After discussion had tangled the matter into an inextricable knot it was decided to accept the printed report of this division up to page 6 and refer the remainder back to the committee.

After the reading of the paper by William Guy Wall on "Details and Peculiarities of Design of Foreign Cars," upon which there was no discussion, the meeting was adjourned.

#### Résumé of the Meeting

After the meeting had adjourned for the last day of the S. A. E. convention in New York, there was an immediate exodus of the members for different parts of the country. President Henry Souther was not able to attend the last session, which stretched over until Saturday afternoon, on account of steamship connections for Europe, where he is to make an extended stay in the interest of professional matters.

In summing up the meeting it may be well stated that it was one of the most successful held by the Society on account of the valuable work performed by the various division of the Standards Committee as well as the valuable papers which were read and discussed by the Society. The discussions were particularly notable on account of the absence of partisanship, and the manner in which they were conducted along purely scientific grounds, untrammelled by the personal references of interested parties. Information (now a matter of record) was given to the Society by the engineers of concerns who have spent large sums of money in experimental and research work. The speakers who expressed their views on the various papers were in nearly all cases men who have specialized in the line of business which was at the time being discussed. It was noticeable by one who attended all the meetings that the personnel of the gatherings changed with each session according as those interested in the different papers were present.

There were a large number who attended all the meetings,

however, and who followed the discussions with eager interest. The discussions on the reports of the different divisions of the Standards Committee showed one thing very clearly, and that was that the body is proceeding very cautiously in regard to adopting as standard any of the parts considered, so that there will be no danger of specifying as definite any dimensions of parts or formulae for material until the matter has been unquestionably settled as the best of practice. In this connection the report of the Iron and Steel Division may be noted. The report of this committee was adopted without change, in spite of the searching debate which was well calculated to bring out any flaws in the report. It now stands as one of the most important documents which has yet been brought out by the Society. This report, which was one of the first read to the members at this latest meeting, attracted the largest attendance in the record of the organization, and among those present were men who were the most competent possible to judge of the report. A large number participated in the discussion of the report, and that it was adopted as it stood marks a great stride in the standardization work of the Society.

The report on springs may be mentioned here as an example of what is being done by other committees which are required by the nature of their work to overcome the greatest obstacles. This report was adopted without change up to its sixth page, and the rest referred back to the committee. In this way it was found that it would not be necessary for the committee to go over some of the early part of the work, but could take it up where it left off.

Optimistic views as to the future of Society were heard on every hand during the meeting of the Engineers, and if the progress of the last few years be taken into account, it seems justified. The program of the meeting showed a diagram plotted in curve form of the number of members enrolled in the Society and opposite the year 1912 it was found that the 1,200 mark in membership had been reached. The slope of the curve which designates the growth of membership is very steep and shows that rapid increases are being made in the enrollment. Altogether, the outlook of the Society is good enough to justify the hopeful views of the members.

Due appreciation was shown by the members of the Society for the courtesies extended by the Automobile Board of Trade, which allowed the Engineers the use of the Assembly hall at the Garden during the session of three days. Another phase was shown when the members passed a vote to send a message of condolence to Patrick J. Hussey, who is in the midst of dire physical distress. All the old-timers know "Pat," and all were glad of the opportunity to express their good wishes at this time.



## Views of Past and Present S. A. E. Presidents

### Ex-President Souther Sums Up



Ex-President Souther

COMMENTING on the progress achieved by the Society of Automobile Engineers, Henry Souther, metal expert and retiring president of the organization, had the following to say:

"On the threshold of its eighth year, the Society of Automobile Engineers occupies a far more important position than ever before. It has grown and developed because it was so framed as to give something material and of great value to its membership to the great automobile industry.

"Its purpose might be likened in a sense to the objectives of the Master Car Builders' Association. Before that body was

formed there was a different-sized axle under nearly every freight car operating on American railroads. There are still quite a number of freight-car axles of different sizes, but they are all arranged in classes and the size numbers have been reduced from hundreds to a score.

"The work done by the S.A.E. may be illustrated strikingly in the way tubing sizes have been affected. When the Society really entered upon the work of standardization it found that something like 1,100 different sizes of tubes were used in automobiles. This was the result of independent designing and draughting work. It used to be the practice for designers to specify odd sizes of tubings where a regular standard size would have answered the purpose. In other words, when the exigencies of design happened to call for a tube 1-64 inch larger or smaller than a standard and when it reached the purchasing agent he ordered just what the drawing called for. This resulted in special orders to the tube makers and extra expense to the automobile manufacturers.

"Since the society has been working along that line the number of standard tubings have been reduced from 1,100 to 120. These tubes will take care of everything usual in automobile construction and if any extraordinary service is required special sizes may be ordered.

"The result of this branch of standardization has been to make for economy in manufacture. Today the automobile designer uses the S. A. E. specifications and the tube manufacturer can supply the regular sizes from stock as a general thing.

"In the matter of lock-washers, there were 700 varieties and sizes a few years ago and now there are thirty-two, sixteen of which might be called light and sixteen heavy sizes. Any design can be made up with these few sizes.

"Referring to wood wheels for trucks, the achievement of the S. A. E. has been notable. In my own experience I have known truck makers to be hung up on deliveries for 6 weeks or more as a direct result of a common practice that now is happily eliminated. In former times every maker of solid tires in the country designed a tire of different dimensions for, say, a 36-inch wheel. When the purchaser of the trucks gave his order he frequently specified the make of tires he wished used. After the truck was finished it was sometimes found that the stock sizes of wheels would not fit the tires ordered and special wheels would have to be built. Through the efforts of the Society the

### Donaldson Favors Big Membership

HENRY F. DONALDSON, newly elected president of the Society of Automobile Engineers, briefly outlined the work of the organization for the coming year.

"The Society," said Mr. Donaldson, "has grown tremendously and is gaining weight and numbers like a rolling snowball. It represents the soul of the automobile industry. The progress made so far in standardization has had a notable effect upon the industry and will become more and more apparent as time passes. The ultimate stage of standardization will not be reached in 1912, but it will show marked progress.

"I favor a big representative body in which the free exchange of thought will be so general that it will help everybody concerned. In a small, exclusive organization only one side of a question is likely to receive full attention, while in a society framed on broad lines the presentations of specialists will aid the general engineers and designers and the practice of the engineers and designers probably will be highly valuable to the specialists. I look for a big, useful year in the Society."



President Donaldson

tire man, wheel man and automobile maker have been brought together. The wheel man made some slight changes which were met by the tire man and the automobile manufacturer sanctioned their proposals, the result being a compromise which reduced the number of sizes and eliminated the odd ones. Several of the most important companies in the industry have announced that beginning with this year they will conform to the S. A. E. standards on wheels.

"As far as steel is concerned, the steel makers, forgers and automobile men have come together. There is no longer any joke about steel specifications as presented by the Society. The notes and instructions are of real value as an aid to all parties concerned. I doubt if there has ever been gathered in one pamphlet so much real information on metallurgy as is contained in the report of the Iron and Steel Specifications Division.

"The Society is down to hard-pan. It deals in practical things. No other society has been able to get the same amount of effort from its distinguished members as the S. A. E. in such a short time. Some of these distinguished men belong to other learned societies, but one never hears that they take the same interest in the proceedings of other bodies as they do in those of the S. A. E. The reason for this is that the Society has so many members who are active in the work, and in committee assignments occasionally an engineer is assigned to report on a certain phase of a certain branch of the industry and his presentation is so close to the most advanced thought on the subject that it arouses the attention of the master minds. They feel that perhaps the conclusions of the engineer are so near the exact truth that responsibility devolves upon them to put the matter straight. In this way the proceedings of the S. A. E. have frequently contained addresses, comments and discussion by the most eminent men in their special lines in the country."

## Periodic Vibration in an Automobile Motor and How to Cure It

### Noticeable in All Six-Cylinder Engines and Sometimes in Fours

#### Flywheel Connected to Front End of Crankshaft by Disk Clutch Is the Remedy

BY JOSEPH A. MACKLE.

WE live in an age of energetic existence, of which the characteristic feature is high nervous tension. As a result follow the many evils to which the highly civilized being is subject—neurasthenia, brain fag and the rest of the formidable list. In the mechanical world, a similar condition has been reached. Every one knows that metals become fatigued, and require the rest-cure, or else annealing, before their normal strength is regained. Similarly with the automobile motor. The older examples were sturdy, heavyweight productions, capable of maintaining a fairly low power output without apparent effort and possessed of a most healthy appetite for gasoline and lubricating oil. The modern high-speed, high-efficiency engine is a vastly different production; its power has been greatly increased, it can work at high pressure for lengthy periods, and its fuel consumption has been reduced to within respectable limits. But certain disadvantages have also come along as well; the modern nervous engine has developed new diseases, just like its owners. The most common complaint, yet one which has not previously been thoroughly discussed, is the periodic vibration trouble.

This periodic vibration is a state of affairs which is observable on all six-cylinder engines, and, to a lesser extent, on four-cylinder engines, which are reasonably smooth-running as regards their normal balancing arrangements. This periodic vibration manifests itself at certain definite engine speeds, and, when such a period is reached, a tremor is felt throughout the car. As the engine speed rises above or falls from this critical value the vibration dies down and normal running is resumed. To one who is not fully acquainted with the actual condition of affairs, the occurrence is a source of much perplexity and often the cause of much diligent search over the car for some loose part which, it is thought, might be creating the trouble.

#### What Causes the Vibration

It has been stated above that the periodic vibration trouble is of much greater magnitude in the case of a six-cylinder engine as compared with a four, the reason being the greater length of the crankshaft. When engines were more noisy and less smooth than they are today, the four-cylinder engine tremor was rarely observable—it was lost in the various other rattles and noises. But the six-cylinder vibration, since it is much greater in magnitude, has for long been known—though the cause was more or less of a mystery. Many people put it down as constituting one of the inherent defects of the six-cylinder engine (imperfect and uneven carburetion being supposed to be another of these) and hence the considerable objections raised against many of the early engines of this type—particularly when manufactured by a maker not of the first grade.

But, before discussing the possible cures of the trouble, it would be as well to give some idea of the causes of this periodic vibration. Everyone knows that a spring has a certain definite rate or period of oscillation; that is, if a spring which is loaded within its normal limit is deflected and then released, it will swing up and down at a certain definite rate, the duration of the periods being called its time of oscillation.

Now, a spiral spring is, in reality, the same as a long shaft which is being subjected to a torsional or twisting force, and hence the shaft which is twisted with intermittent motion exhibits the same effects as a spiral spring which is carrying a varying load; that is, the shaft will oscillate to a certain extent with a comparatively small amplitude, this amplitude varying proportionately with the load. But if the period of oscillation caused by the variation of the load happens to coincide with the natural period of the shaft, then the amplitude of the oscillation becomes greatly increased. If the impulses which cause the variation of the load happen to continue at this particular rate, the abnormal oscillation of the shaft will also continue, dying away to its normal value as the rate of variation of the load increases or decreases again.

With this in mind, the explanation of the threshing trouble should prove to be quite easily intelligible. The shaft above referred to is the crankshaft—by its shape, very much less stiff than a plain shaft and therefore more liable to oscillation. In point of fact, a six-cylinder crankshaft of the usual form possesses less than half of the stiffness of a straight shaft of the same diameter. The period impulses are supplied by the explosions, as they occur successively on the six crank throws of this comparatively springy shaft. At low speeds, the variation of load will usually be much slower than the natural oscillation rate of the shaft, but as the speed increases, the period impulses will at length have the same time as the crankshaft period and then the oscillation will become bigger and bigger, like the working up of a swing boat which receives small impulses just at the correct moment at the commencement of each swing. When this state of affairs is produced, vibration is set up and a tremor is apparent throughout the car. This tremor is caused not only by the fact that the drive becomes irregular at this speed, but also because the twisting oscillation of the crankshaft, comparatively small though it is, suffices to vary the actual crank angles and thus to destroy the efficiency of the balancing arrangements. When the engine speed increases, the explosion impulses follow each other at lesser time intervals and the load variation ceases to harmonize with the natural period of the crankshaft. Thus the tremor will die down and normal running be again resumed. When the speed reaches a certain higher value, which is a definite multiple of the former rate, the tremor will be likely to occur again, and so on right through the whole range of speed. In the ordinary car engine, however, there is usually only one period of vibration, the higher periods coming above the normal speed of running. As to where the period will occur in any particular engine, this is quite above the range of calculation and is a matter for experiment to determine. On some well-known engines it occurs at a speed of 300 revolutions per minute, or about 10 miles an hour car speed. On other engines the tremor is not felt till the engine is doing, perhaps, 1,500 revolutions, and the car is traveling along at 40 miles an hour or more. The latter case is, of course, to be preferred, for at high speeds the engine vibration is merged into the general vibration set up by the unevenness of the road surface and is therefore not particularly objectionable.

So much, then, for the causes of the crankshaft vibration; it exists, as has been said before, on all engines; in general, the more silent and the more refined the engine, the more likely is the threshing trouble to be observable. This point deserves mention, for to the uninitiated it might seem that vibration trouble of any sort was a sign of bad design or faulty workmanship.

And now for the cure. A considerable amount of investigation of the subject has been made by F. W. Lanchester, the well-known British automobile engineer, and it is his vibration-damper which is fitted to the 1912 type Deasy, Daimler and other engines. It consists, in effect, of a flywheel which is connected to the front end of the crankshaft by means of a disk clutch attachment (of the standard automobile form, with twenty-four steel disks, but with reduced spring pressure) so that a certain amount of relative motion between the driving and driven portions is possible. As long as the crankshaft turns



## Restoring Varnish Brilliancy After the Car Has Seen Some Service

### Medium Chosen Must Clean, Feed and Maintain the Surface

Ideal Cleaner Must Be Neutral, That Is, Free from Acid,  
Alkali or Water

By M. C. HILLOCK.

**I**N a previous article the writer, in commenting upon the care-taking of the automobile, dealt at some length with the matter of washing the car. The benefit derived from the use of clean, soft water was summed up in detail, and incidentally water was made to appear, as it really is, an indispensable medium in connection with the up-keep of the car.

However, there comes a time in the active service of the car when the varnish has passed the stage of wear which will permit the exclusive use of water to fetch out its lustre or in any way serve to maintain its serviceable resources.

Just before this period of varnish life is reached it is advisable, in case it is not wished to shop the car for a new coat of varnish, to make use of some of the cleaners and varnish renewers sold under various titles at the present time.

Of course, there are good cleaners and restorers as well as those not so good. In making choice of such mediums, therefore, the car owner may very well exercise discretion, making use, so far as possible, of the material which best promises to meet the requirements of the surface.

Whatever the medium chosen it should have the capacity, first, to clean the surface; second, to feed it and coax the worn and enfeebled powers to renewed strength and vigor; third, to maintain this new condition and prolong the wear and usefulness and protective properties of the varnish.

It is a well-established fact that varnish upon the automobile, as a rule, begins to lose its best brilliancy in four or five months, and in eight or nine months it has in large part lost its usefulness, and in from ten to twelve months its virtue as a surface protective medium has departed altogether and for all time. This is the situation, practically, where no cleaners nor renewers have been employed.

If this period of wear and service can be prolonged, and the appearance of the surface kept neat and fresh during this in-

with uniform motion, the clutch will drive the flywheel uniformly, but as soon as any irregular motion takes place the clutch will begin to slip. When such relative motion or slipping of the clutch does take place, there will be an absorption of power and this is the reason why the device serves to damp out the vibrations. As soon as the periodic oscillations tend to commence, the drag of the frictionally driven flywheel exerts a damping effect on any differential motion between the driving and driven parts and hence the oscillations are prevented from mounting up to the stage where their effects can be felt as a tremor through the car. In actual practice, there is no possible doubt as to the effectiveness of the device; anyone who makes a trial of a car thus equipped is compelled to admit that vibration is entirely non-existent at all speeds. The damping device requires non-attention from the user except occasional lubrication, and it cannot possibly get out of order.

A similar device to the one above described is used on the Rolls-Royce cars; and certain other experimental methods of curing the vibration trouble have been used, with more or less success, by other British makers.

creased period of use, then it is fair to consider the varnish renewers and renovators as supplies necessary to the equipment of every well-regulated garage.

Coming directly to the nature and composition of the varnish cleaner and renovator we may say candidly that, first of all, the really safe cleaner for the car surface should be a neutral cleaner, i. e., a cleaner entirely free from acid, alkali or water. This cleaner should contain no drying oils. It should be a medium which if not entirely wiped and cleaned off the surface with soft rags or pieces of cloth will remain soft and ready for further wiping for days and weeks, if necessary. It should give the parched and hungry surface something to feed upon and draw sustenance from and not impart a merely temporary luster at the price of permanent injury to the protecting varnish as is done by some renovators.

The use of the neutral cleaner as often as once a week, and perhaps a little more frequently, if the amount and nature of the service to which the car is exposed seems to justify it, is in order as soon as the water baths fail to bring out the luster of the varnish.

### Benefits Depend Upon Proper Application

Much of the beneficial effect secured from using the neutral, non-drying oil cleaners depends upon how the cleaner is applied and wiped off the surface. Soft cotton waste, perfectly clean and absolutely free from any particles injurious to the surface may be used to excellent advantage both for applying the cleaner and for removing it or wiping it off. Clean, soft cloths are likewise available for wiping off the cleaner. A soft, flat brush is often used for applying the cleaner. Never rub the surface harshly. When the cleaner is applied often enough, or as often, in fact, as above advised, hard rubbing in applying and removing the cleaner will not be necessary.

It should be understood in this connection that in the event of the car becoming splashed and spattered with mud it should be given a thorough washing with water and a clean drying off with the wash leather after which a renewing of the varnish with the oil cleaner may very well be given.

It has been incidentally stated in the foregoing that the neutral oil cleaner should contain no drying oil. Linseed oil is a drying oil unsurpassed in its capacity to add life to any paint or paint medium, in which it is employed, and this property has been greatly misunderstood, it appears, by people both in and out of the business of consuming automobile surface cleaners and renovators. Linseed oil is not infrequently mentioned in connection with cleaning and renovating the automobile surface, whereas as a strictly drying oil it is not adapted to the purpose, and under no circumstances should it be used for such a purpose except as a contributory ingredient in a combination cleaning and renewing medium where its effect is neutralized, and in the direction above indicated rendered void, by a more influential medium.

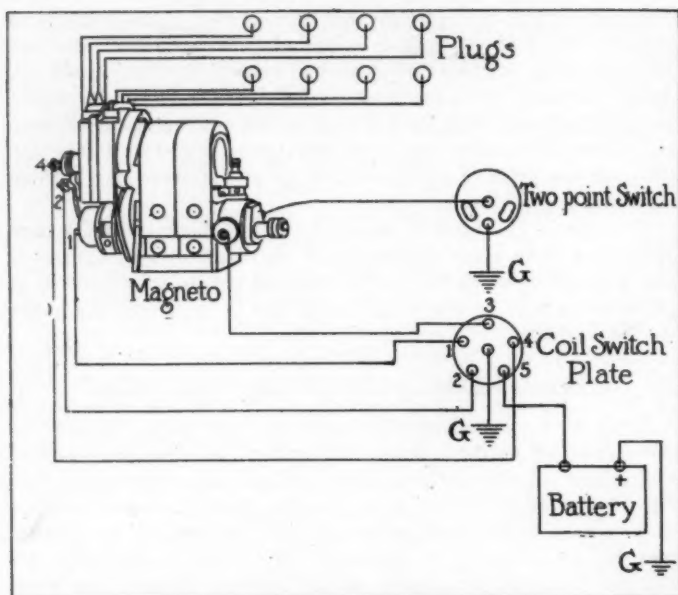
Recommendations as plentiful as tramps on the march for a hot breakfast are handed out in the daily and weekly papers anent the virtues of linseed, petroleum and other oils, including, in some instances, cottonseed and lard oil!

With all such oils have nothing to do. They are unfit to use upon the delicately wrought surface of the automobile. Their use means immediate deterioration of the appearance and wearing properties of the varnish. They should have no part nor lot with it.

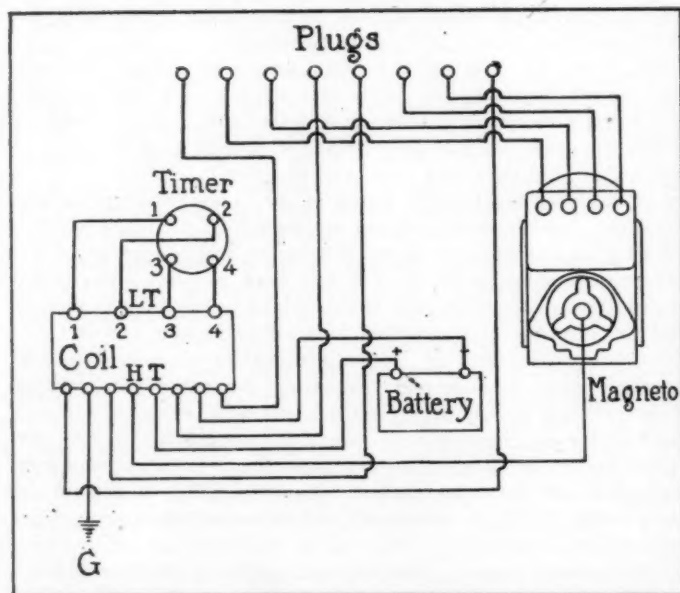
Preparations for cleaning and renewing the automobile varnish should have some refinement of matter and effect blended into their composition, and lacking this, which the crude oils herewith enumerated manifestly do, they may very wisely be omitted from any list of cleaning and renovating materials intended for use upon the automobile.

Finally, when the automobile surface reaches a state of wear that leaves no adequate protection for the colors under the varnish, the car should be taken to the painter for expert advice and treatment.

# What the Big Shows Have Brought



Bosch dual two-point high-tension system



Double system showing independent battery timer

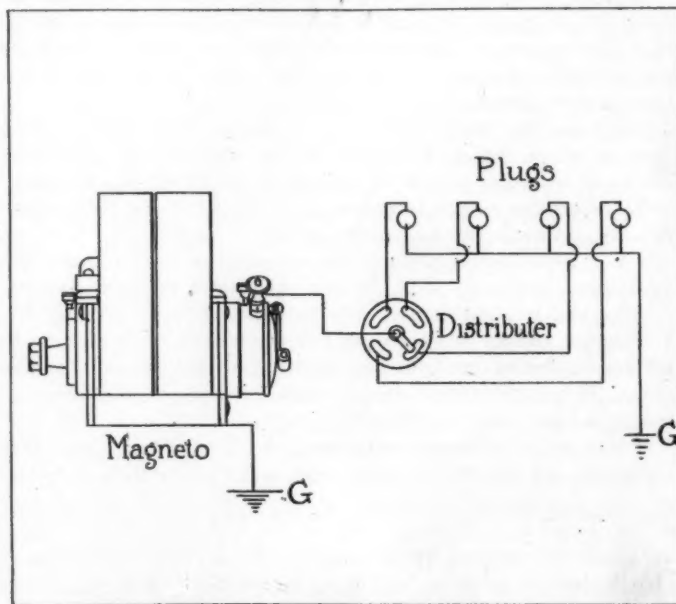
**I**N KEEPING with the advances and improvements which have been made along other lines of automobile construction and the developments which have been taking place in things related to automobiles, the manufacture of magnetos has been given much attention. As a result, this year's models show many improvements in ignition, among which may be mentioned the perfecting of methods of using fixed advance, two-spark systems, starting on magnetos and many lesser refinements.

Perhaps it might be well at the start to settle any doubt which may exist as to what are meant by high-tension and low-tension magnetos. A low-tension magneto acts simply as a source of current, and it is used with a vibrator coil and timer. Its only function is to furnish a source of current, just as any ignition battery does. Magnetos of this type must ordinarily be driven

## Many New Features Are in Evidence Tending to Reduce the Automobile's Ignition Troubles

at a speed much greater than that of the crankshaft—from three to four times greater. They can be attached to the motor at any convenient point and can be driven in either direction, the manner of driving being immaterial.

High-tension magnetos are very different from the low-tension type. Their use does away with separate vibrator coils and timers, and it is necessary to drive them at a speed relative to that of the motor. The high-tension windings take the place of the separate induction coils. They have a fixed direction of rotation, depending on the side of the motor on which they are mounted. These magnetos are complete ignition systems within themselves, in many types no battery being required for starting. High-tension magnetos are driven at crankshaft speed for four-cylinder motors and at one and one-half times that speed for six-cylinder motors. Obviously, for automobile purposes the latter is far superior to the low-tension system, and few cars



Single high-tension system, no battery being used

are now constructed which do not make use of its principles in one way or another.

A number of ways have been devised to fire the cylinder charges by the use of high-tension magnetos. They are the dual, two-independent, double, two-spark and single systems. The wiring diagrams of these are shown in the accompanying illustrations. In the dual system there are two sources of electric current, namely, the magneto and the battery. The two are so interconnected that either will ignite the charges, the change from one to the other being effected by throwing a switch usually located on the dash. The same spark plugs and distributor are used whether the motor is running on the battery or on the magneto. For best operation, the circuits of the battery and magneto should be arranged so that they are independent in other respects, thus causing the least effect on the work-



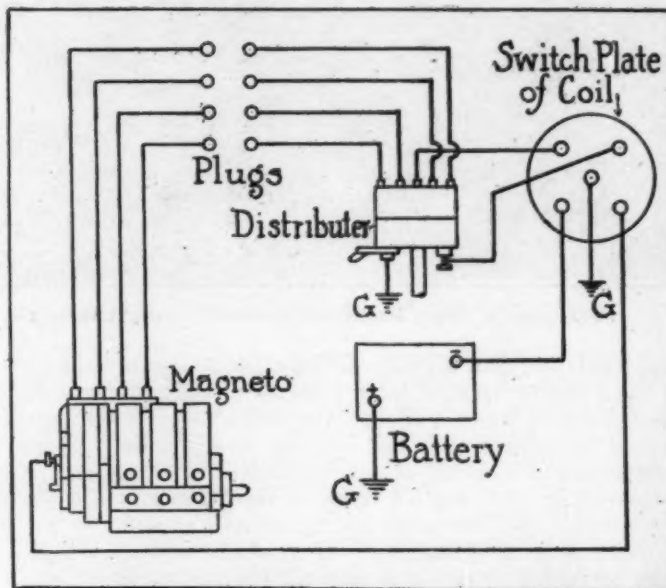
# Out in the Ignition Field for 1912

## Automatic Spark Control Devices and Dual and Two-Spark Systems Numerous. Magnetos More Compact

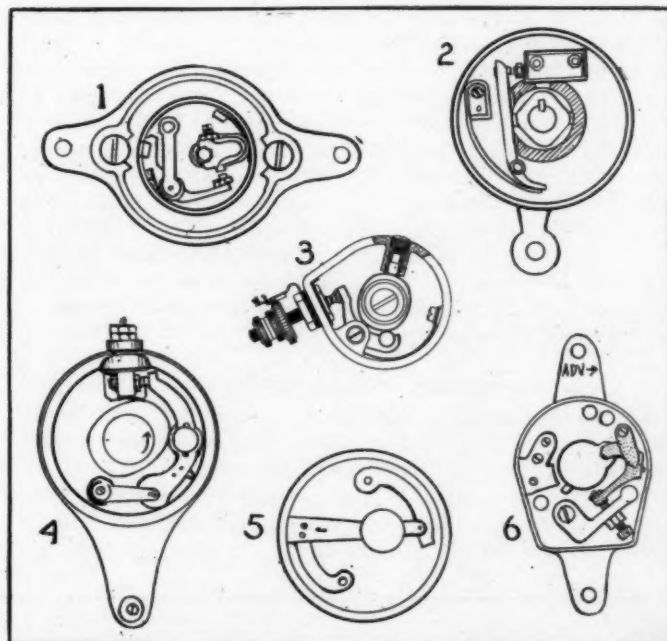
ing system should one or the other break down. To be satisfactory for its purpose, a dual system should make it possible to operate on either battery or magneto at ordinary engine speeds without interfering with the efficiency of the engine.

The next to be considered is the two-independent system. This makes use of two separate sets of spark plugs and is therefore only applicable to engines which are built to carry the double number. The Bosch Magneto Company is the originator of this idea. The battery system consists of a combined coil and switch and a timer-distributor, which are entirely independent of the magneto. The two systems are brought together at the switch, and the connections are such that the engine may be operated on the magneto with one set of plugs, or on the battery with the other set, or on the magneto and battery together, in which case both sets of plugs spark.

The double system does not differ to any great extent from



Bosch two-independent ignition wiring diagram

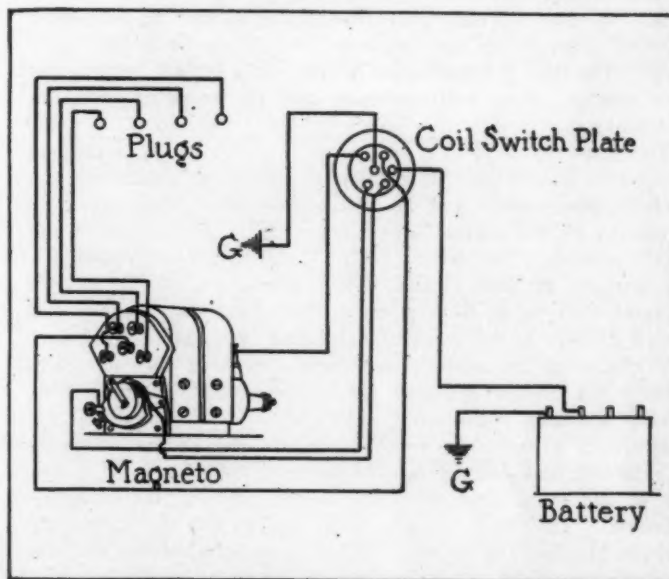


Group of breaker boxes. 1. Elsemann; 2. Bosch; 3. Remy; 4. Splitdorf; 5. Briggs & Stratton; 6. Pittsfield

that just mentioned. The two are the same except for the fact that with this latter system, the same timer and distributor are used for both magneto and battery circuits.

As its name implies, the two-spark or two-point system produces a spark simultaneously at two places within the firing chamber, thus reducing the time required for the complete firing of the charge. The advantages of such a system on the rapidity of combustion are evident, but the difficulty lies in producing the two sparks at exactly the same instant, although systems of this kind which have been lately devised have been very successful.

Single ignition makes use of one system only, either the bat-

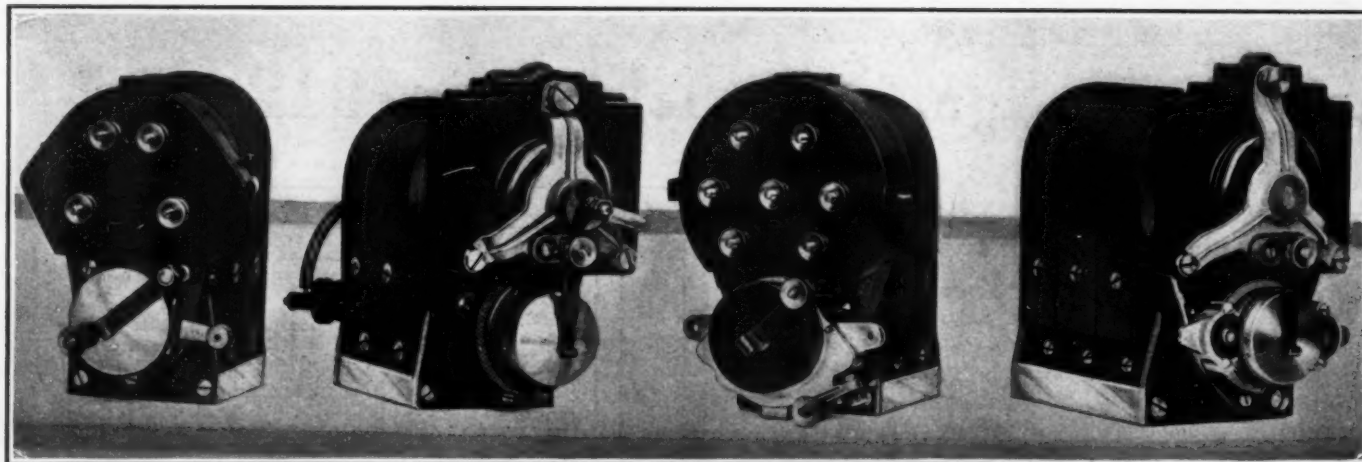


Dual ignition system. Either battery or magneto may be used

tery or the magneto alone furnishing the electric current. Several makers have perfected single magneto systems, which make it possible to start the motor without the use of auxiliary batteries.

### Bosch Company Makes Five Types

For 1912 the Bosch Magneto Company will manufacture five principal magneto types. These are types DU, DA2, DR, DU6 and D. The first of these is an independent magneto for use on motors having from one to six cylinders. It will produce as efficient a spark in the full retard position as in the full advance, thus permitting very ready starting and slow running on the magneto. Its armature is carried on large-size ball bearings, and it is self-contained, no external apparatus being required. The four-cylinder motors it operates at crankshaft speed. Type DA2 is used for small single-cylinder engines and is confined



Four types of Bosch magnetos. From left to right these are the DU Independent, two-spark, dual and D Independent types

chiefly to motorcycle equipment. Type DR is a two-spark instrument and is intended for engines up to eight cylinders of any size. It is unusual in that it operates two sets of spark plugs simultaneously, each pair of plugs being in series. By an arrangement of sparking devices, the failure of either plug or its connecting cable will not check the operation of the other. Like the DU type, this model has its armature mounted on ball bearings. Type DU6 dual apparatus is similar in general principles to the DU, also. It is intended for six-cylinder motors up to a size of 4 1-2 inches by 4 1-2 inches. When this magneto is used in dual form, two separate contact breakers are provided, so that the only parts which the battery and magneto have in common are the distributor, secondary leads and spark plugs. The type D independent instrument is intended for large-size motors. It is self-contained and its armature runs on ball bearings.

For small four-cylinder engines it is often an advantage to operate on a fixed point of ignition, this not only suppressing the timing-control lever and its connections, but precluding any possibility of the engine being strained by unskilled use of the spark control. The Bosch DU4, Model II., is arranged for use without variable timing. The interrupter housing is permanently set in such a position that the cams operate the circuit breaker at the point of maximum inductance.

For starting the engine on magneto without the use of a battery the Bosch company has brought out an instrument having specially constructed polepieces. These polepieces are designed to intensify the retarded spark. One of the polepieces is extended and formed into broad teeth, the bases of which are in the same position as the single edge of the ordinary polepiece. The ends of the teeth extend to approximately midway between the magnets. With these polepieces an ignition

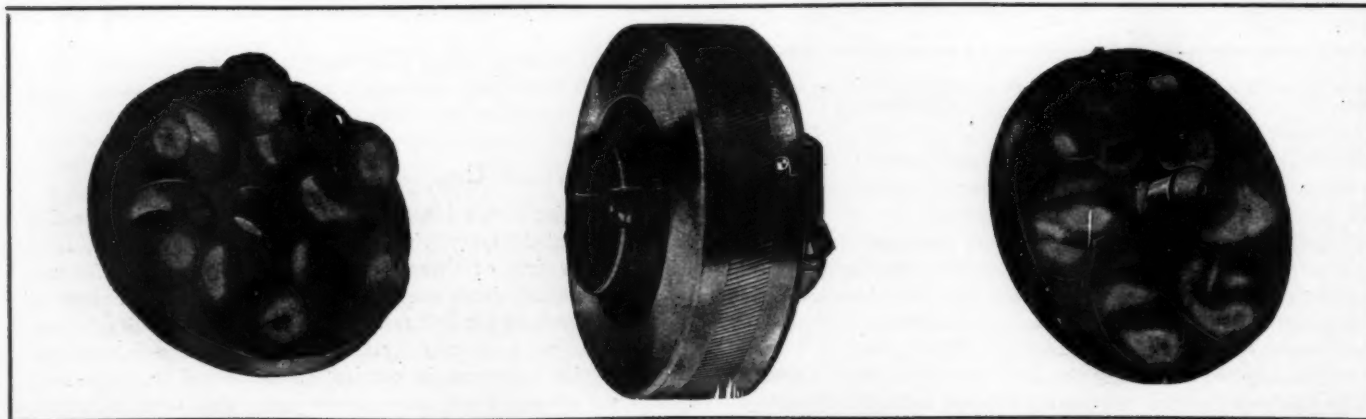
spark is produced while the rear edge of the armature core is passing under the teeth. When the armature is thus moving the ignition spark is produced at fixed speed and therefore at as low a speed at one point as at another. With the spark control in the full advance position, a spark is produced as the edge of the armature core passes the roots of the teeth, and in the full retard position, a spark is generated when the rear edge of the armature leaves the ends of the teeth.

#### Splitdorf Shows Few Changes

As formerly, the feature of the Splitdorf magneto line is the model T. This magneto has a vertical distributor block combined with it. With this magneto it is possible to start the motor from the magneto side, ignoring the battery. A sketch of the breaker box will be found in another part of this article. The contacts are of platinum and the circuit is made and broken in the usual way by means of a revolving cam. With the Splitdorf system both poles of the battery are brought to the transformer. The battery is not grounded. The new model O differs from the other model in the modification of the distributor block, it being considerably reduced in size, permitting installation in a smaller space than the model T. The same form of breaker box is used and in other respects it conforms to the general Splitdorf construction.

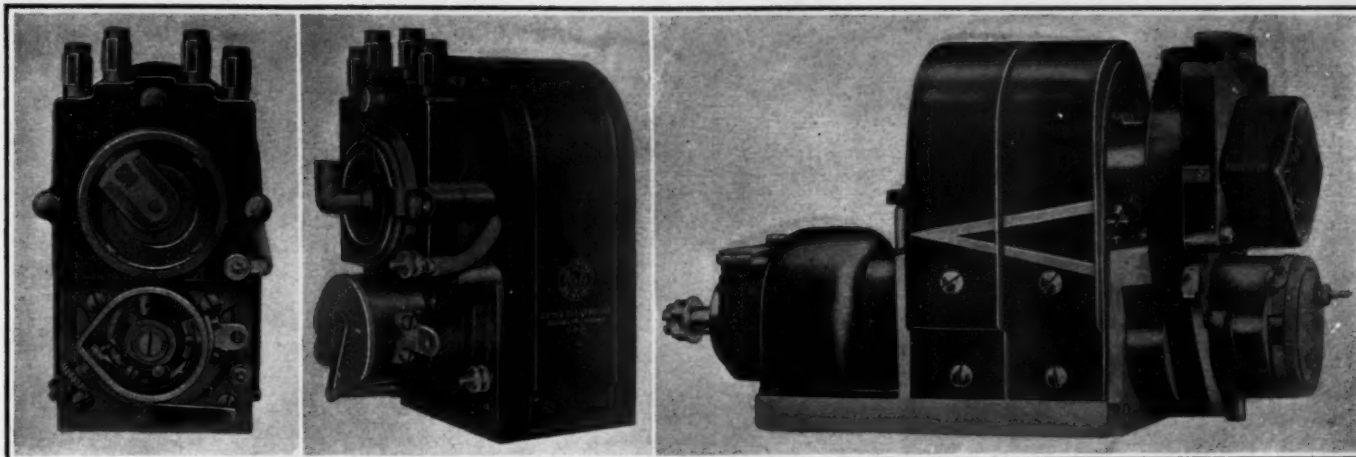
#### Eisemann Pole-pieces New

The Eisemann types embody a number of new ideas, among which are the new pole-pieces. The use of these makes it possible to start the engine from the magneto side, or, in other words, for getting a spark at low engine speeds. In order to produce a high voltage a strong magnetic field is required to pass through the middle of the armature. On the



The Herz automatic timing adjustment. On the left one of the disks is shown with balls, the mating disk being on the right. The complete device and coupling are seen in the center





Latest Remy type. Front and side views

Eisemann magneto with automatic advance

older Eisemann pole-pieces the lines of force were not all made to pass through the armature, and consequently many lines were lost. The new pole-pieces are pointed in the middle, so that all lines of force are made to pass through the armature in or in the neighborhood of these points, thus producing a higher magnetic field at the points. Elsewhere will be found a sketch of the breaker box of one of the Eisemann models. Instead of having cams to strike the lever and so open the circuit, this contact breaker has large steel pins led into lugs at the sides in such a way that the inside of the pins protrude inside, providing a cam effect. The screw holding the contact breaker disk is secured by a safety spring, preventing the loosening of the disk. To lubricate the fibre contact lever pieces a small oil wick is placed on the inside of the cover. The fibre pieces at each revolution touch this oil wick, which is kept moist by the oil from the bearings.

The automatically timed magneto, which is new to this country, is included in the Eisemann line for this year. In this magneto a cage is rigidly mounted on an extension of the armature shaft. A block slides in this rectangular cage, and it is drilled and threaded for the reception of a helically-cut driving shaft, which is attached to the gearing. This has a square-cut double thread, the block moving up and down on it. Governor balls are attached to the block by links. Revolution of the shaft causes the balls to fly out by centrifugal force, with the result that the block is rotated, carrying with it the cage in which it works and the armature shaft to which the cage is fixed. The armature is thus advanced, and likewise the contact breaker, which is attached to the end of the armature shaft, as already stated.

#### Remy Adds an Inductor Type

The new model RD magneto offered by the Remy Electric Company is of the inductor type. Two steel inductor wings are revolved within a stationary winding which forms the magnetic instead of the more usual form of revolving an armature consisting of a soft iron core on which is wound a number of turns of fine copper wire between the pole-pieces of permanent magnets. With this new Remy system the inductor principle is carried out by the use of a single winding of coarse magnet wire which is embodied in the pole-pieces of the magneto. The inductor wings are of laminated steel, one on either side of the winding. The stationary winding is direct-connected through the magneto circuit breaker with the primary of the non-vibrating step-up transformer coil. The timing of the spark is accomplished by the shifting of the breaker box around the inductor shaft, to which the breaker cam is attached.

The breaker box is smaller than in other Remy types, some improvements being incorporated in its construction. The new contact screw is held by a lock spring. In making an adjustment the spring is pulled up and the screw turned a few notches either way. An oiling wick is also placed within the

breaker box, rubbing against the cam. The distributor gear, which is located on the drive end on other Remy types, is placed on the other end in this new type, allowing a reduction in the length of the distributor shaft. The distributor is made of bakelite, which is a heat-resisting, insulating material recently adopted for this purpose by the Remy Company.

Other new Remy types are the double distributor, designed for use on high-powered machines, particularly those having T-head motors; the RE type, which is also a double distributor machine, having the second distributor on the drive end of the magneto; the RF type for use on special trucks or tractors, having three sets of magnets for application to low speed, heavy duty motors and the RG type, which is a double distributor, three-magnet machine having its second distributor on the drive end also.

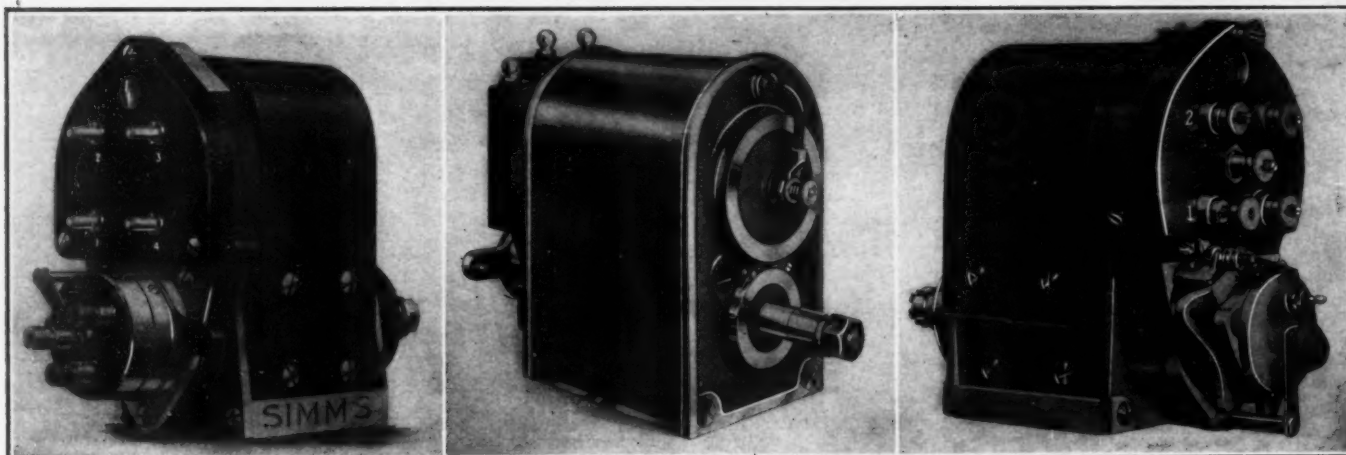
#### Herz Unique Timing Adjustment

The Herz product presents a novel appearance, the magnets being in the shape of circular disks about half an inch thick. These are made of Syrian magnet steel, ground on all sides and bolted together. The end casings are of cast aluminum and they are fastened to the magneto with steel bolts. These casings contain the armature annular ball bearings. In addition to the primary and secondary windings on the armature, the condenser is built integral with it and rotates with it. The secondary winding connects to the primary and the condenser forms a shunt to both. The breaker box is located on the armature shaft in front of the condenser. The breaker box casing has a hardened steel segment protruding from one side. As the armature revolves a fibre roller comes in contact with this segment and is raised thereby. This causes it to engage the spring on the end of which one of the platinum points is carried and thus to break the contact with the other platinum point, which is stationary, being mounted on the end of an adjusting screw.

The unique feature of the Herz ignition system is the auto-



Showing construction of Atwater-Kent contact maker



Simms magneto, SU type

Connecticut independent and dual type

Elsemann magneto, type EM

matic timing adjustment which has recently been brought out. This consists of two disks, which are placed together between the magneto apparatus and the main shaft. Each of these disks is provided with six curved grooves running in opposite directions, one ball running in each of the combined grooves. The balls act in the same manner as governor weights, being forced outward from the center by centrifugal force to an extent corresponding to the speed of the motor. These balls impart a twist to the armature of the magneto in relation to the main shaft in proportion to their distances out from the center. Therefore for every engine speed there is a corresponding position for the balls and hence a different relative position of armature and main shaft. This automatic adjustment is supplied either as an integral part of the ignition apparatus or in the form of a coupling.

#### Simms Pole-pieces of Novel Form

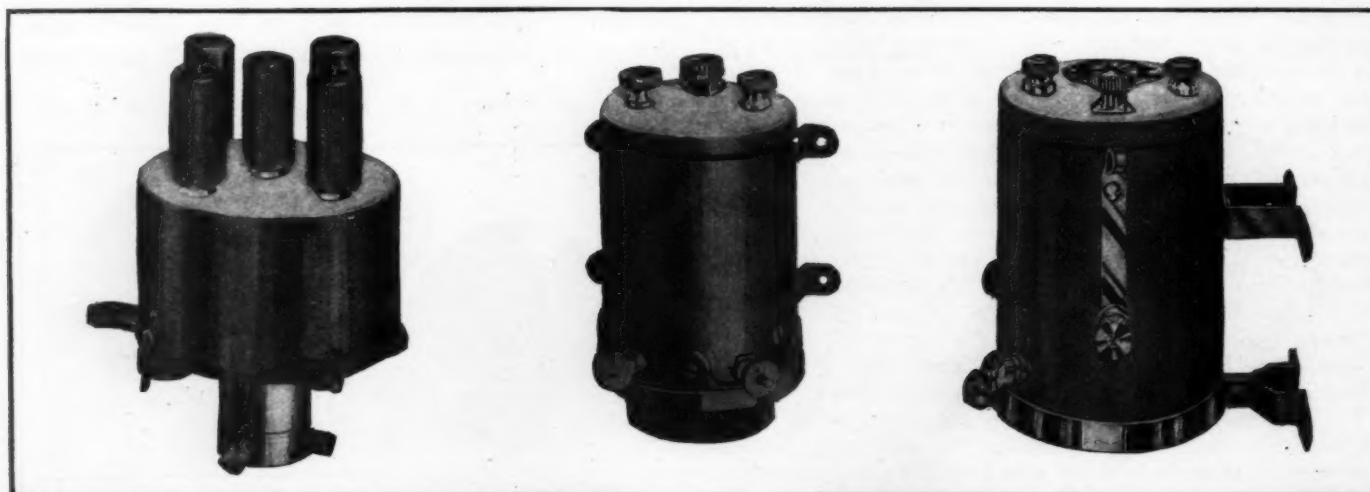
In the Simms system producing sparks of sufficient magnitude to ignite cylinder charges at low engine speeds is made possible by means of the specially shaped pole-pieces. The magnetic lines of force are intensified by the notching of these pole-pieces at points back from their ends, thus making two regions of greatest intensity. The lines are first intensified as the edge of the armature passes the first point, and by the time it has reached the second at the end of the pole-piece they have traveled around through the iron to this point. When the armature passes out from under the pole-pieces the available lines are thus doubly strengthened, producing a good spark at low speed. Only one Simms magneto is on the market at present, this being the SU type.

#### Refinements in Connecticut Line

The Connecticut magneto is made in two types, the independent and the dual models. The 1912 line of this make is practically the same as last year's, with the exception of a few minor changes. In the distributor the carbon contact block has been done away with and a metallic plug which runs about six or eight-thousandths of an inch from the contact block is used in its place. This reduces attention to the distributor block to a minimum, as the contact surfaces are so arranged that no amount of running will burn the points and change the adjustment. To facilitating timing an indicating arrow has been placed on the rear of the magneto, together with proper line marks on the shaft. As in the usual construction, the interrupter in the breaker box is provided with a single roller which bears against the cam pin. A steel spring holds the platinum contact points together. The breaker arm presents a rigid appearance and is of semi-circular form, being pivoted to the cup at one end. The advance lever can be connected at either side of the magneto, the breaker box being reversible. The circuit breaker proper is held in a cup, which may be withdrawn for adjusting the contact points and the like. Various other ignition equipment is manufactured by the Connecticut Telephone & Electric Company, among which may be included timers, dash coils and marine coils.

#### Accessibility a Kingston Feature

In addition to its other ignition apparatus, the Kokomo Electric Company manufactures a line of magnetos for all purposes. The general construction is similar to that of other standard types. The end of the breaker box is covered by a

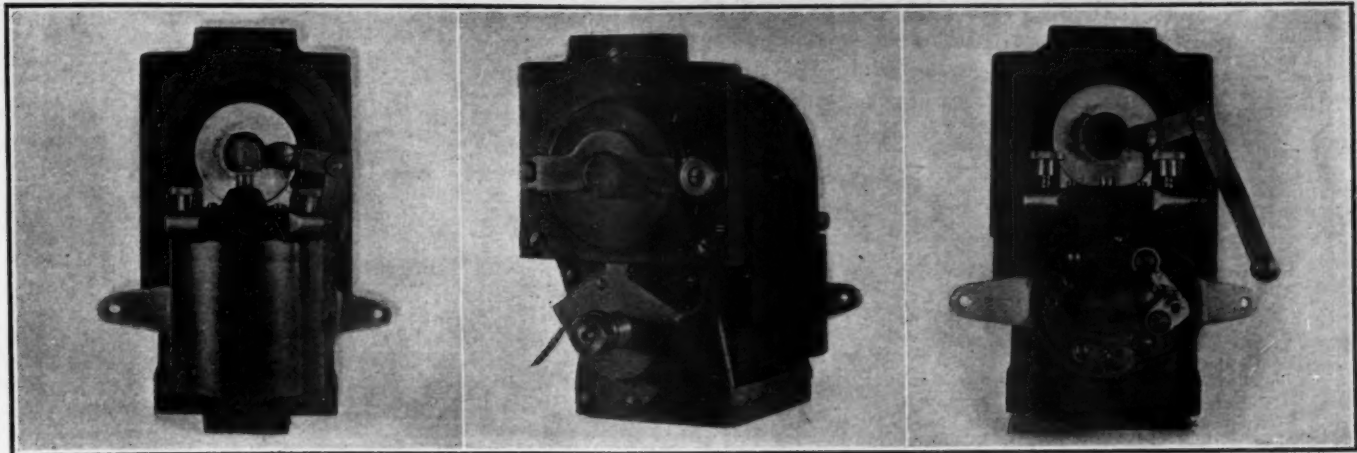


Rhoades distributor and timer

Briggs &amp; Stratton master vibrator

Briggs &amp; Stratton plug transformer





Three views of Pittsfield type NB. Left, rear end view; Center, front view; Right, rear with interrupter exposed

plate which is held by two spring clips. Removal of this cover allows a circular rocking frame to be taken out. This rocking frame carries two fibre rollers, over which a steel contact finger runs. This finger makes and breaks the circuit of the current coming to it from the primary coil by way of an insulated contact screw. The ignition timing is accomplished by rocking the frame. The model A magneto has a large diameter armature, making it possible to produce spark at low engine speeds. The model B magneto produced by this concern is designed for use with double ignition systems; model C for one or two-cylinder motors, and model D is a three-magnet type for heavy-duty work.

#### No-Lag Has Peculiar Features

The American Circular Loom Company manufactures magnetos under the trade name of No-Lag. The system in which these machines are used has no distributor or half-time gears. The transformer is divided into two units, making it necessary to operate only half at a time. The magneto breaker box presents the usual form, the contact points being of platinum. Special oiling devices for lubrication of the contact cam and other moving parts are provided. The armature shaft is mounted on annular ball bearings. The magneto is of semi high-tension type, a low-tension current being generated which is transmitted to a transformer and there boosted to a high working voltage. On account of the peculiar arrangement of the make-and-break device, the low-tension current is sent to this transformer in two separate pulsating circuits. With this distribution system, two spark plugs are operated in a series circuit instead of the usual way of distributing a high-tension current to each plug, the return being made through a ground connection. Sparks are thus produced in two cylinders and they are timed to take place in one at the end of the compression stroke and in the other at the end of the exhaust stroke. The idea of this is that the spark occurring in the exhausting cylinder cleans the plug points and intensifies the spark in the cylinder under compression. Ordinarily no battery is used with this system, although the transformer is provided with battery terminals so that one may be used if desired. The magneto is constructed to operate at low engine speeds with retarded spark.

#### Pittsfield Uses No Moving Wires

In the Pittsfield construction there are no moving wires on the armature, the high-tension current being generated in the stationary magneto coil. This coil is placed on the rear end of the magneto. The dual type is self-contained, there being no high-tension switch and step-up coil. One end of the primary winding is connected to the interrupter and the other to a three-point switch, so that when the lever of this switch is on the magneto side the primary lead is grounded, allowing the magneto to run as a true high-tension machine.

Other types of Pittsfield machines are model NA for two-cycle motors, which has the same general appearance as the

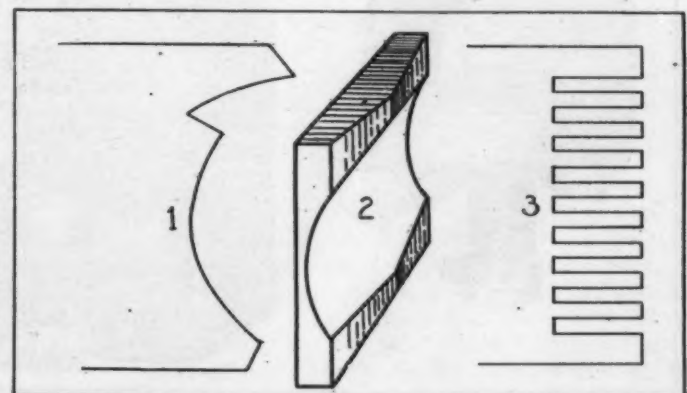
other types; model N for small motors which require no timing; model NC and model NCB for six-cylinder motors. These types differ from one another only in the features which are made necessary for the uses to which they are put.

#### K-W Standard Types Continued

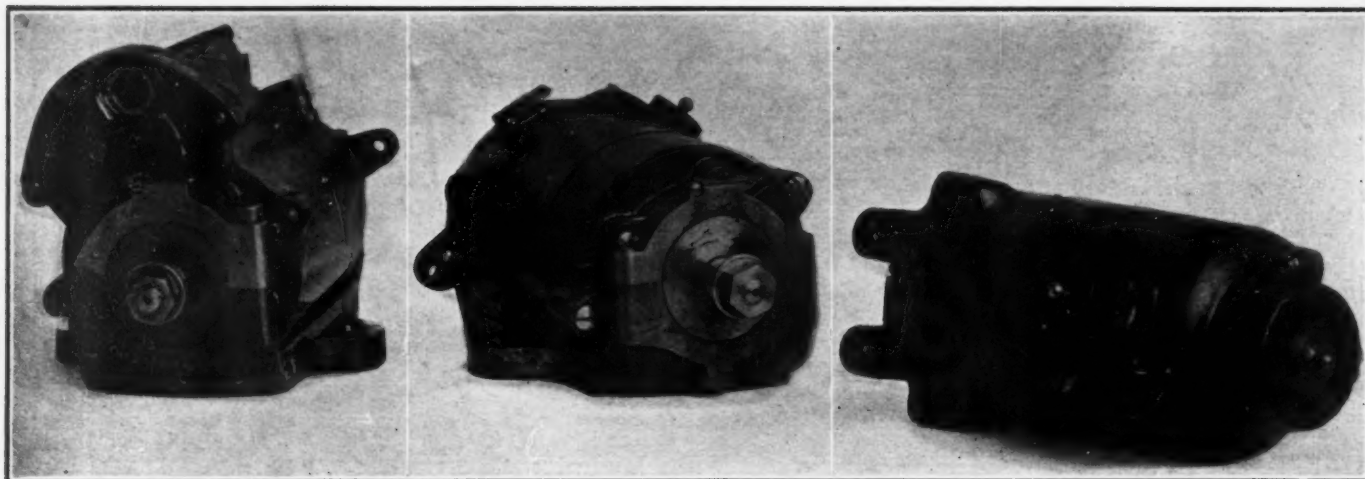
The same line of high-tension and low-tension machines are carried by the K-W Ignition Company this year as it carried for the previous season. There are three models of high-tension machines, consisting of a small type for marine and automobile motors of small dimensions, the medium-sized type for engines up to 40 horsepower and the large model for use on large motors. The same type of circuit breaker is used on all K-W high-tension magnetos. It is arranged to have 30 deg. advance or retard. A hardened chrome steel roller is in contact with the breaker cam, and there is a flat spring which serves to keep the circuit breaker arm pressed down on the cam. The lower platinum contact point is made adjustable to take up wear. An adjusting screw and lock nut are used for this purpose, a hole in the breaker box frame below this screw making it possible to insert a screw driver to make the adjustment. All parts of the breaker box are made of tempered chrome steel. There are no marked changes in the low-tension machines of this make, and they present the same general appearance and construction as heretofore.

#### Many New Mea Importations

The Mea magnetos, which are sold in this country by Marburg Bros., are of a rather peculiar construction. Instead of the usual form of horseshoe magnet, this construction embodies a bell-shaped magnet, placed so that its axis coincides with that of the armature. The whole magnet is moved about its axis and by so advancing and retarding the field the same heat value of spark is obtained at all motor speeds. In this construction the magnets and breaker are moved simultaneously



Pole-piece construction. 1. Simms. 2. Elsemann. 3. Bosch



Three models of the peculiarly constructed Mea magnetos, in which bell-shaped magnets are used, these moving about their axes

instead of the advance and retard of the breaker alone. As a result of this the relative position of the armature and field at the moment of sparking is maintained.

Among the newer importations of this firm is the dual type of Mea magneto. The particularly interesting feature of this type is that the battery breaker is mounted on the distributor shaft instead of on the main armature shaft. This is done so that the battery breaker will not interfere with the accessibility of the magneto breaker. The dual type has about the same dimensions as the independent Mea type, except that it is slightly longer.

The model A4, which is the smallest type carried by the firm, is a magneto with a stationary shell and a magnet inside this shell rather than a design in which the whole magneto is advanced and retarded in the frame. This magneto retains the same general Mea lines, but it is entirely inclosed, thus being protected against dust and water. All important points may be reached by the removal of two screws.

In addition to the types mentioned, models for any number of cylinders up to eight, for both dual and independent systems, are carried by the concern.

#### Briggs Centrifugal Controller

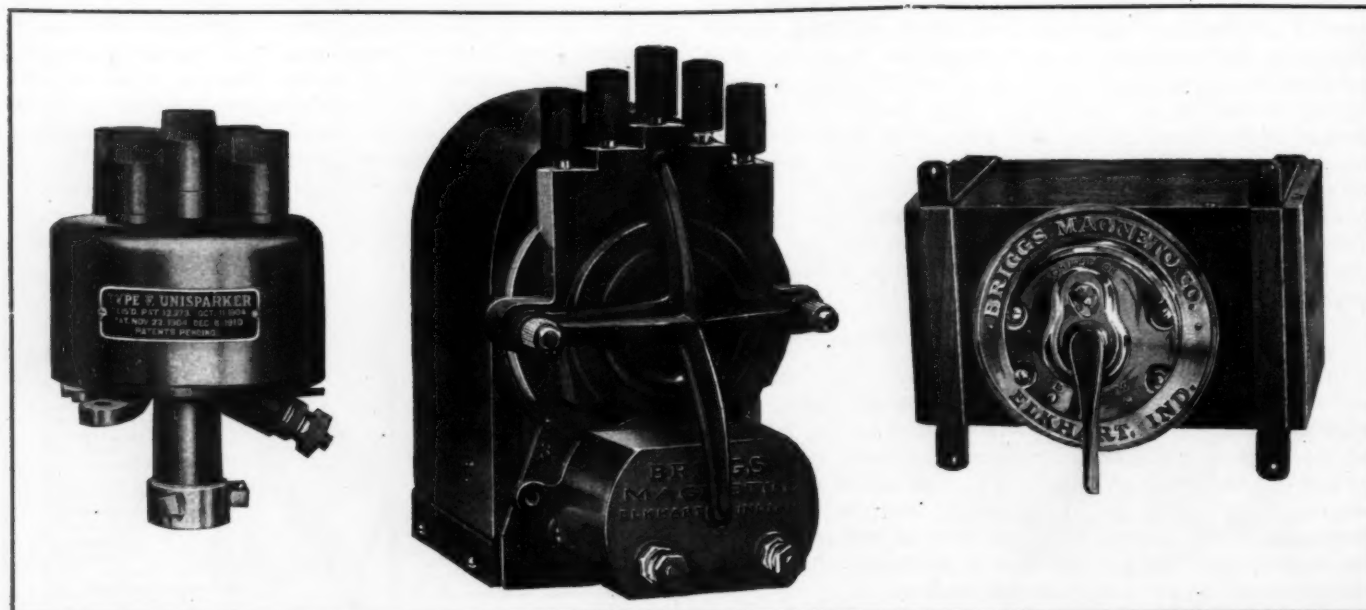
In the Briggs the magnets are of large size and are made of Tungsten magnet steel. In general appearance this machine does not differ from that of other makers. The breaker parts

are heavy. The case-hardened steel cam operates a roller of the same material on the contact arm. The breaker points are platinum iridium, and provision is made for their adjustment. The circuit breaker parts are oiled by means of an oil cup which feeds the lubricant to the cam through a wick. A shield protects the breaker points from this oiling device. All Briggs magnetos are equipped with a dual system. For automatic spark control a centrifugal controller is made. The breaker for this equipment is fixed in relation to the armature. When the car is at rest the spark is retarded and as the motor is speeded up the control arms gradually extend centrifugally, thus advancing the spark.

### Other Ignition Apparatus

#### Atwater-Kent Unisparker Retained

No radical changes have been made in this device, which has been on the market for a number of years. The Unisparker is installed on the motor timing shaft in place of the regular timer or commutator. Where there is no timer shaft it is usually arranged to run by means of gearing from the magneto shaft. The principle of this instrument consists of the production of a spark of sufficient size to ignite cylinder charges across the secondary terminals of a special form of induction coil by suddenly breaking the inducing or primary current. The contact maker and breaker is the special feature of the system. It

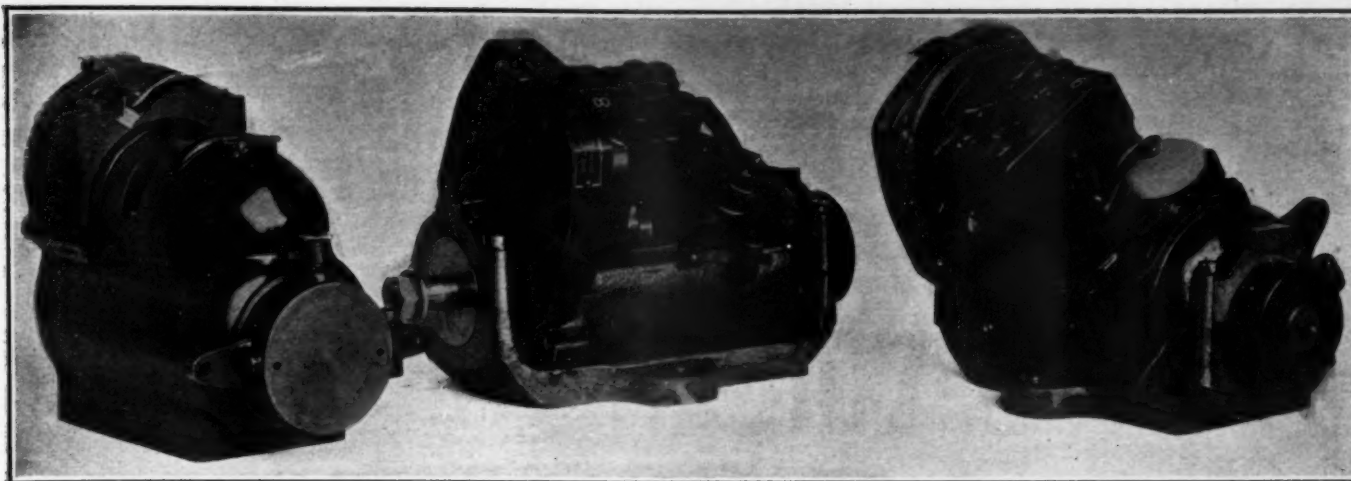


Atwater-Kent Unisparker

Latest type Briggs magneto

Briggs dash control switch





Recent additions to the Mea line. On the left the new model A4 is depicted. It is of the usual construction, but entirely inclosed

consists of a disk rotated by a shaft, the disk having as many notches or teeth cut in its edge as there are cylinders. A pawl or lifter rests against the notched disk and it is pulled forward by the disk in its rotation since it is engaged by one of the disk teeth. After being carried forward as far as the rotating disk will carry it the pawl is released and is pulled back into its original position by a spring. In returning it rides up over the notched disk and bears for a brief instant against the projecting lip on the under side of the contact arm, throwing this over and closing the primary circuit. As the lifter returns to its normal position the contact arm is pulled back by its spring and the circuit is almost instantly broken, producing the desired inductive effect in the coil. The whole device is inclosed in a cylindrical casing, from the top of which the terminals protrude.

#### Briggs & Stratton Devices

Among the ignition specialties produced by the Briggs & Stratton Company the new devices are the master vibrator and the plug transformer. The first of these does away with the difficult hand adjustment of three or four separate vibrators to the same speed. All the vibrating is done with the one unit instead of having independent vibrators on the coil units. To prevent the objectionable feature of the use of a single vibrator, namely, that of the deposition of the platinum from the positive contact point onto the negative, a switch is used to automatically reverse the current every time it is turned on. The instrument is inclosed in a vulcanized fibre case so as to be water and dustproof. The vibrator is mounted in the head of the case and is easily removable. The body of the case contains the core and the two parts are entirely separate.

The plug transformer is mounted directly on the spark-plug by means of brackets, which clamp around it. The vibrating coil, primary switch and secondary connection are all embodied in the one apparatus. No secondary wiring is used, and the device is water, heat and oil proof on account of the special casing used. Four types of the transformers are made for various methods of connection to the spark-plugs and cylinders, while two of the types can be used only with single cylinder engines which do not employ separate ground circuit breakers. These transformers measure 2 5/8 inches by 3 5/8 and they can be used either with or without master vibrators.

#### New York Coil Company Products

Few differences are to be noted in the ignition specialties manufactured by this company. The Rhoades unit spark system is continued. On the inside of this sparker a small condenser has been added, eliminating the spark at the contacts and making the necessary adjustment of these contacts less frequent. The use of hard rubber for the distributor has been discontinued, a molded composition of greater heat-resisting properties replacing it. This new material is also said to better

resist climatic changes. Improvements have been made in the vibrator, making it more rapid on the break and causing less current consumption. The contact breaker retains its general appearance and the process of making and breaking the circuit is unchanged.

The Rhoades timer distributor has been improved by the addition of a small felt roller which revolves and deposits oil on the wearing surfaces.

#### Duplex Combination Magneto

The Duplex Magneto & Spark Plug Company is marketing a high-tension and low-tension magneto combined in one machine. This is accompanied by a set of magnetic spark plugs, there being a high-tension and a low-tension electrode in each plug. Either ignition may be used at will without stopping the motor by throwing a switch. In addition to this, a high-tension magneto is put out by the firm.

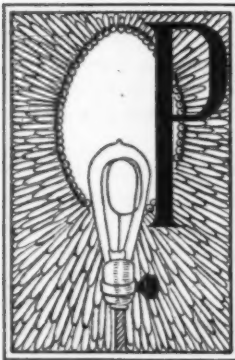
#### Monitor and Bemus Specialties

The Monitor distributor is designed for use on any car having either a single or a dual ignition system. It is sold by the Motor Specialties Company. With the apparatus the secondary current from a single unit coil may be used. Its general appearance is not unlike that of other devices of the kind which are on the market. An easily removable cover incloses the contact parts. In addition to this, the company sells the Bemus timer, which is of very accessible and compact construction. It measures 2 1/2 inches in length, while the diameter of the insulation ring is 2 1/4 inches. The contact is accomplished through the use of a beveled roller and a steel ball. All terminals are of the spring-connector type.

#### Oxygen for Welding

According to a report by A. E. Tucker to the Society of Chemical Industry, any impurity, even a slight one, in the oxygen used for cutting or welding metal by the oxy-acetylene flame has an extraordinary effect in reducing the heat of the flame and delaying the work. He insists that there should be neither hydrogen nor nitrogen in the oxygen, both acting as diluting agents. If the purity passes from 99.4 per cent. to 58.4 per cent., the same iron wire requires 60 seconds instead of 4 to be cut through. If the impurity grows from 2 1/2 per cent. to 33 per cent., the time for cutting grows from 1.10 times normal to 3.47 times normal. The cuts are much cleaner, too, with pure oxygen. The gas should be at least 99.5 per cent. pure. At 98 per cent. the results are mediocre, at 97.6 bad. Carbonic acid gas has a similar effect, an admixture of 10 per cent. of it reducing the heat effect 19 per cent. and the illuminating power 50 per cent.—From *Bulletin Société d'Encouragement*, October.

# Electric Lighting for Automobiles



PERFECTION of electric systems of car lighting has been aimed at for several years, and while it would savor of boldness to assert that the end of the evolution of automobile illumination has been reached it is impossible to deny the fact that the art has attained a sufficiently high state to provide such lighting systems as give a constant and very satisfactory service, with small trouble and at a very moderate expenditure.

Car illumination bears a very definite relation to the speed of the machine the system is installed upon. This is under-

stood immediately upon considering the conditions under which automobiles operate on the road. If a car is traveling at a speed of about 10 miles an hour a system which illuminates the road for some 40 feet ahead of the automobile may be quite adequate, since at that rate of propulsion the car may be stopped without difficulty within a distance of 20 feet. If the automobile travels at twice the speed mentioned the momentum of the car becomes twice what it was at 10 miles per hour and the distance needed for stopping it by the same braking effort will be proportionately in excess of the distance needed in the first place. Modern automobiles traveling at an average rate of 20 miles an hour are equipped with brake facilities capable of bringing them to a standstill within 50 feet, which is enough to avoid a mishap of any kind, if the driver keeps his eyes on the road ahead.

But the brake equipment is of slight value in the night, unless its use is combined with that of an effective lighting system projecting a powerful beam of light on the road ahead. Naturally, the faster the car is run the more urgent becomes the necessity of an effective illuminating system. Half a dozen years ago, when touring was still in its infancy, the problem of illumination was given little thought, as tourists were satisfied to move along at a slow rate. That was the time when motor enthusiasts were content with the light afforded by oil lamps. But with all the refinements which came to be introduced in automobile construction during the following years taste and also the pretensions of the automobilists increased marvelously, so that the coarseness of those rudimentary lighting systems was soon felt deeply. While some engineers sought to solve the problem by the use of acetylene illumination, which gave a powerful light indeed, others strained their brains to design electric systems giving an equal illumination with a simpler and quicker method of operation. But it must be said for acetylene lamps that their ease and

speed of lighting has been greatly facilitated by the many self-lighting devices that are now on the market.

The simpler and quicker operation of electric lamps as compared with acetylene lamps was always and still is the strongest talking point of electric illumination salesmen. And it is true that electric lighting, regulated by a simple cut-out switch, as it is in modern systems, surpasses in comfort everything heretofore produced in headlight illumination. A single movement of the hand suffices to throw the lights on or off.

When the idea of electric illumination for gasoline vehicles was first conceived batteries were resorted to as a current-supplying source, but the shortcomings of this course were recognized very quickly. The voltage of the average battery output varies 14 per cent. from full charge to discharge. This fluctuation in voltage is accompanied by a very noticeable and disagreeable variation in candlepower of an incandescent lamp which is designed for a certain voltage. This experience caused the engineers to look for another means of car lighting, and the construction of lighting dynamos was laid down as the most desirable solution of the problem.

An electric lighting generator looks so simple and compact that the layman would be apt to think that its development was an easy task. As a matter of fact, a very great amount of work has been expended in this direction recently, but the success achieved has proved this energy to have been well invested. The principal difficulty lay in the construction of a machine which would deliver a constant supply of current at constant voltage to the lamps. Several solutions have been developed by the various concerns in the field, some using a centrifugal governor cutting out the drive when the dynamo goes beyond a certain number of revolutions per minute, while others have designed apparatus giving the necessary voltage and amperage at a very low speed and using storage batteries to absorb the surplus current generated at higher speeds. Another problem in the construction of the lighting generator has been to so design the machine as to insure perfect commutation at all speeds of engine and dynamo respectively, lest the brushes in the generator be ruined by sparking.

There are several types of lighting equipment. The first comprises the dynamo, made in a compact size and of conventional design, which is in most cases mounted on the side member of the motor frame and driven positively, either by gear or chain, sometimes by friction or belt. Practically all dynamos operate at all times when the engine runs. In order, however, to be independent of the engine when the car is at rest a battery is used in conjunction with the generator, it being larger or smaller depending on its ampere-hour capacity.

A good deal of the details of these

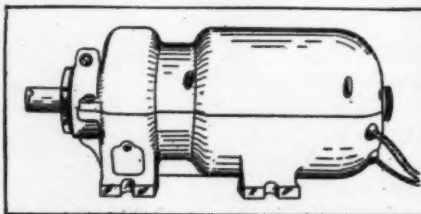


Fig. 1—Exterior of the Gray & Davis automobile lighting dynamo



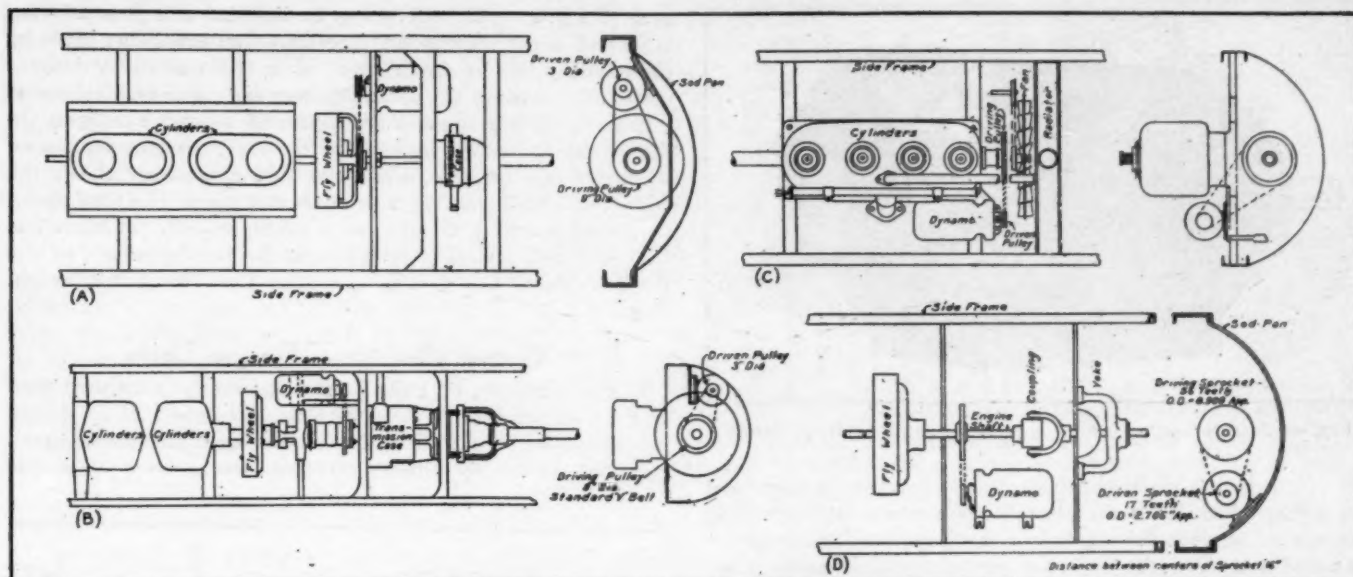


Fig. 2—Showing method of installing Gray & Davis dynamo on A, Marmon 32; B, Chalmers 30; C, National 40; D, Stevens-Duryea

equipments depends on the wishes of the purchaser; for instance, the size and capacity of battery and lamps. The weight of the battery varies with the various makes, and a buyer will, in almost every case, be able to select a battery suiting his specific needs.

Some types of dynamo are designed along magneto lines, as it may, in many cases, be easier to find a place on a car for a generator of this shape. As various as their shapes are the manners of regulating the dynamos of these several types. There are some that are operated at constant speed, no matter what the engine speed is, by using a flexible sort of drive between motor and dynamo shaft. Others are positively driven, either at engine speed or faster, and an overproduction of current is obviated by the introduction of a resistance in the field. Another type has two fields, one of which assists or opposes the effect of the main field, or is cut out entirely at times. The principal point in all these types is to keep the amperage constant and the voltage as nearly so as possible, in order to avoid destruction of the filaments. Most metal filaments will readily stand a voltage of 25 per cent. in excess of their ratings, but it stands to reason that any straining of the filaments shortens their lives to some extent.

The second group of generators is representative of the most modern trend, in that it generates a direct, low-tension current, part of which is stepped up in a transformer for ignition purposes. The apparatuses employed differ widely; still several designs have been perfected to render an unfailing performance.

The third group, in addition to furnishing current for ignition purposes, serves for starting the car. Here the electric generator is so constructed that it may either operate as a shunt-wound dynamo or as a series-wound motor, in which latter case it draws upon the storage battery for current. After the engine has been started, the shunt-field comes into action and the machine operates as a dynamo.

In the following the three classes of generators will be described and the details of the system, including size and capacity of battery, candlepower of lamps and price of the complete equipment, given for the information of the motorist contemplating the future use of such a system.

#### Gray & Davis Constant-Speed Dynamo

In Fig. 1 is seen the Gray & Davis compound-wound dynamo, designed to run at a speed of 1,200 revolutions per minute. The constant speed results in a very small range of voltage of the current generated by the dynamo, and consequently in a steady strength of light from the lamps. The Gray & Davis concern, in order to be able to utilize the compound-wound type and avert the use of special windings and automatically operated field rheostats, has designed a special sort of drive which permits just enough energy to be transmitted from the motor to the generator to rotate the same at a speed of 1,200 revolutions. This drive is illustrated in Fig. 3, and is constructed in combination with a regulator of the centrifugal ball type.

The several elements of the self-regulating drive are shown in Fig. 3A. The shaft S is directly driven by the motor of the car, and is connected to the clutch member A. This is an aluminum casting, with central openings and fan blades cast integrally with the spoke members, and faced with asbestos. When the dynamo is assembled for use the facing A1 of the aluminum member is installed opposite the cast-iron wheel I, frictional engagement obtaining between them. The cast-iron disc, which is also provided with central openings and fan blades acting in the same direction as those on the aluminum disc, is pressed against the latter by the vanadium steel spring V to insure intimate engagement of both discs. When the shaft S is rotated at moderate speeds, up to 1,200 revolutions per minute, the two discs remain in perfect engagement; but if the shaft attains a higher rotational speed the centrifugal governor C, Fig.

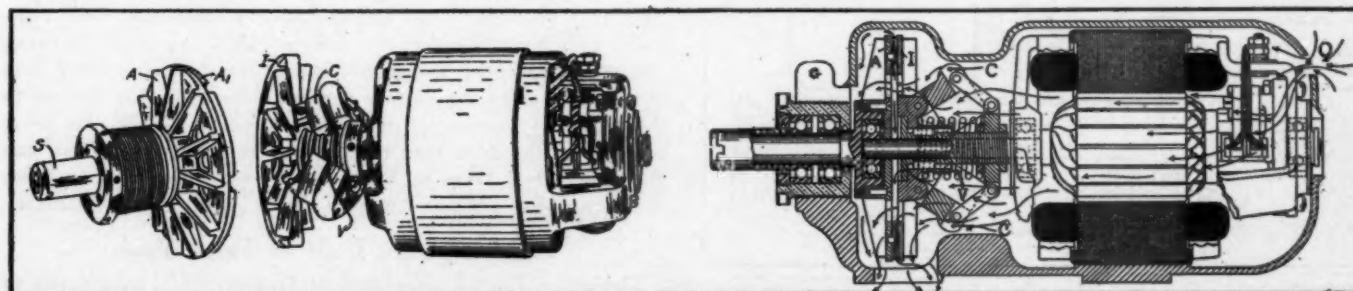


Fig. 3—A, Gray & Davis' driving clutch and commutator; B, section of dynamo showing relation of parts and manner of cooling

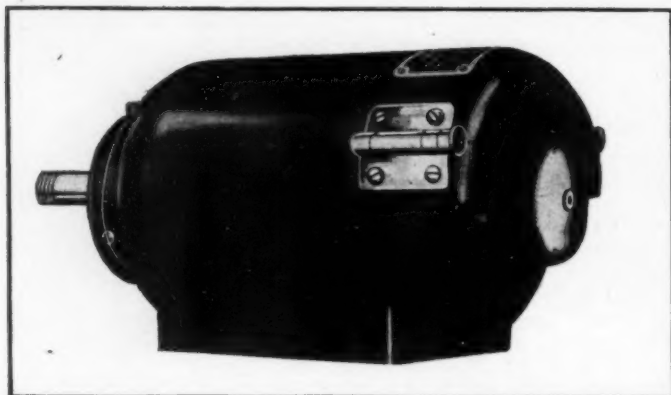


Fig. 4—Outside view of Aplco dynamo, showing compact design

3B, is lifted some distance off the axis of rotation, compressing the spring which holds the discs in engagement, and loosening the contact between driving and driven member. The construction and weight of the governor are such that it causes some slip of the clutch at all speeds above 1,200 revolutions and regulates the amount of slip to such an extent as to permit the dynamo shaft to be rotated at 1,200 revolutions per minute.

The governor weights are so proportioned that the pressure of the spring at normal speed will drive the dynamo with 50 per cent. overload, but will release completely at 5 per cent. overspeed. As stated above, the clutch slips, at rotational speeds above 1,200, always enough to permit the dynamo to turn at that speed. Since a speed of 1,200 revolutions of the shaft S is approximately equivalent to a traveling speed of 12 miles an hour, it is evident that in touring work the iron disc is bound to slip very frequently, and as heat is generated by this process some efficient means for cooling must be used, and it is represented by the fan blades cast integrally with the clutch discs. The arrows in Fig. 3B show the path of air drawn in by the blades, the air being sucked in through an opening O at the end of the dynamo casing, whence it passes through the commutator and then plays around the rotating armature, to further pass on and cool the clutch surfaces.

The dynamo operates as a compound-wound generator when the lamps are turned on by the switch, while, if the lamps are not used, the current goes to charge the battery, the dynamo acting as a shunt-wound one. The three cells connected in series have 60, 80 or 100 ampere-hour capacity. The cut-out is an electro-magnet, compound-wound, with the fine-wire parts connected across the dynamo terminals. In starting the engine voltage increases and when it has become equal to the battery voltage a small reverse current flowing through the coarse magnet winding, by weakening the pull on the magnet armature, causes the dynamo circuit to open and to stay so till the dynamo voltage has again equaled that of the battery.

The location of the Gray & Davis dynamo on various cars is

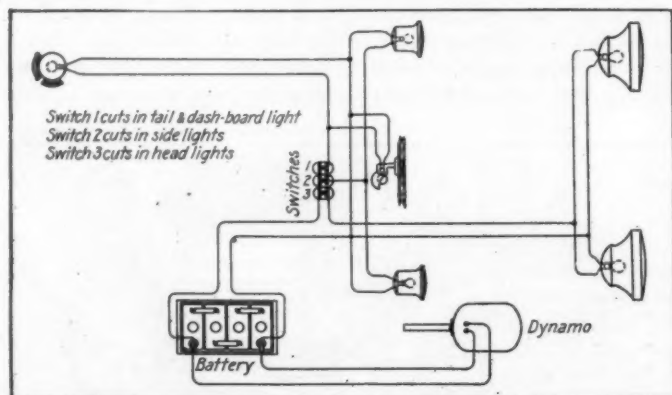


Fig. 5—Arrangement of dynamo, battery and switches in Holtzer-Cabot scheme

seen in Fig. 2. The battery may be installed at a point of vantage, and is not seen in the diagram. The headlights made by the company take 16 candlepower, or 24 if the customer desires; dash and tail lamps are 4 candlepower each, and each consumes 1 ampere, while 2 amperes are consumed by each headlight. On the ammeter, which is installed on the dash, the consumption on the lamp may be read, while the indicating finger shows the voltage if a button on the instrument is pressed. The total power required for driving the dynamo is 1-6 horsepower per hour. The Gray & Davis system is installed on the stock products of the Peerless Motor Car Company, and on Columbia Silent Knight cars for 1912.

### Wagner Has Direct Dynamo Drive

The arrangement of units in the lighting system constructed by the Wagner Electric Manufacturing Company, of St. Louis, Mo., is shown in Fig. 6. The dynamo is of the shunt-wound type and driven by chain-shaft-chain transmission from the

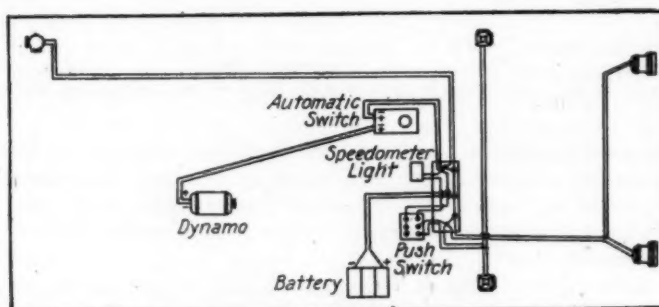


Fig. 6—Wiring system of units in Wagner lighting system

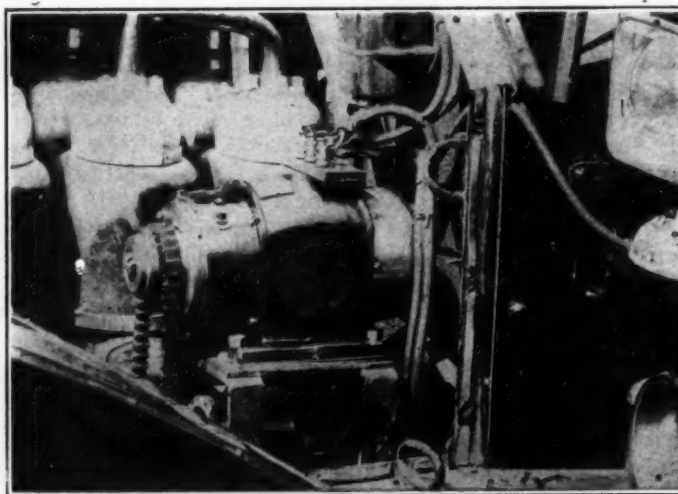


Fig. 7—Showing the Ward-Leonard dynamo in place on a car

crank or cardan shaft. The drive is not shown in Fig. 6, but this illustration brings out the wiring, and needs no further explanation in this respect. As the dynamo is of the shunt type, the field does not require to be weakened at increasing speed, and perfect commutation is insured under all conditions. The generator operates at all speeds above a minimum. An automatic switch contained in the system closes the circuit between dynamo and battery, so that as soon as the dynamo voltage is in excess of that of the battery current flows from the former to the latter. A reversal of conditions opens the switch, this being the case if the generator speed drops below its minimum, and then the battery takes up the task of feeding the lamps. These lamps are low-voltage tungsten lights with coarse filaments.

### Aplco Dynamo Built in Three Types

The Apple Electric Company, of Dayton, Ohio, as a result of many years' experience with automobile lighting, has divided



all makes of cars in three classes, according to their average running speed. One class comprises all makes which may drive a dynamo without very high reduction at 1,600 revolutions per minute, the other two classes including cars driving dynamos at an average of 850 and 400 revolutions respectively. For each of these classes a special size of dynamo has been constructed, and the most advantageous location of the generator on each standard product has been worked out to a nicety by the maker of the lighting system.

The Aplco dynamo, Fig. 4, is contained in an electric steel frame casting made with solid bearing heads to insure perfect alignment of bearings and obviate lost motion. Armature and commutator are constructed with twenty-one sections, in order to obtain good commutation under all conditions of running. High grade ball bearings carry the carefully ground steel shaft.

The brushes are of the self-lubricated type and are contained in a holder apron of insulating material; they stand at an inclination of 45 degrees. The commutator end of the dynamo is

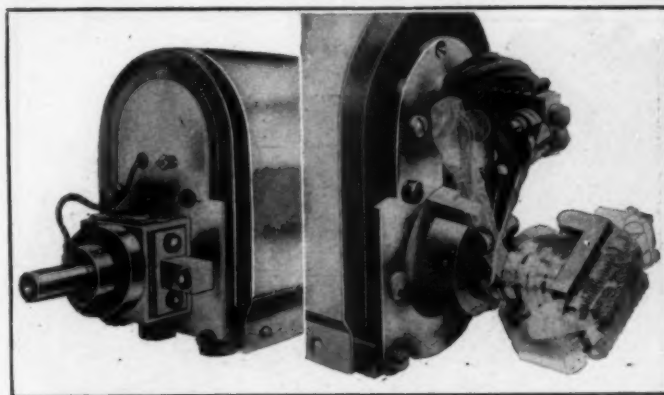


Fig. 10—End view of Vesta magneto and details of the same

good reputation for this make of battery, and the capacity is such as to warrant the owner in letting the lamps burn for some time.

The total power of each Aplco system is 60 candles, and the factory recommends the use of 20-candlepower lights for the headlamps, 4-candlepower lights for side and tail, and 6-candlepower for dome lights and 2 candlepower for the dash lamps.

### Ward-Leonard Has Automatic Switch

The system of the Ward-Leonard Electric Company, Bronxville, N. Y., is illustrated in Fig. 7. The dynamo, which is of the shunt type, is driven by sprockets and silent chain, and no shifting field or shifting brushes are used. A distributor divides the current between illuminating and ignition systems, two batteries being used in combination with a switch. The throw-over switch insures both batteries being kept fully charged. The circuit leading to the ignition system is grounded, but the illumination circuit is not.

Automatic control is provided by means of a voltage switch connecting the dynamo to the batteries when the latter's voltage is lower than that of the generator. A reverse current coil on the switch protects the dynamo from reversed currents originating in the battery when the speed of the dynamo is cut down. Maximum speed is regulated by an automatic switch inserting a single step of resistance in the field of the generator, which reduces the output to a predetermined amount.

The 1912 stock products of the Cole Motor Car Company are equipped with this lighting system. Headlights radiate 21 candlepower, side and tail lamps 4 each, and 2 candlepower is the strength of each dash lamp and the speedometer light.

### Simplicity in Holtzer-Cabot System

The design of the dynamo made by the Holtzer-Cabot Electric Company, Boston, Mass., is such that the working parts are entirely inclosed and the whole apparatus self-contained. The dynamo works together with a battery, which is used for the purpose of storing the surplus current generated by the electric machine. This battery is of the non-sulphating type, the Edison

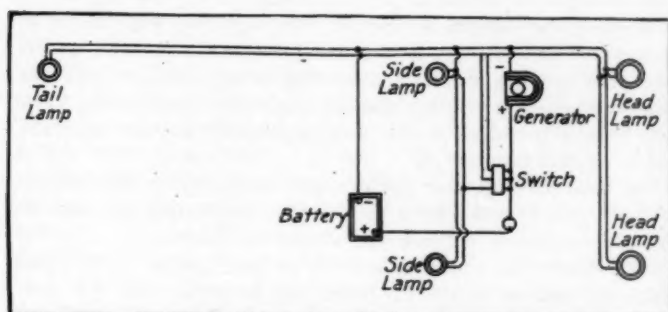


Fig. 8—Layout of Perfection Illuminating system for automobiles

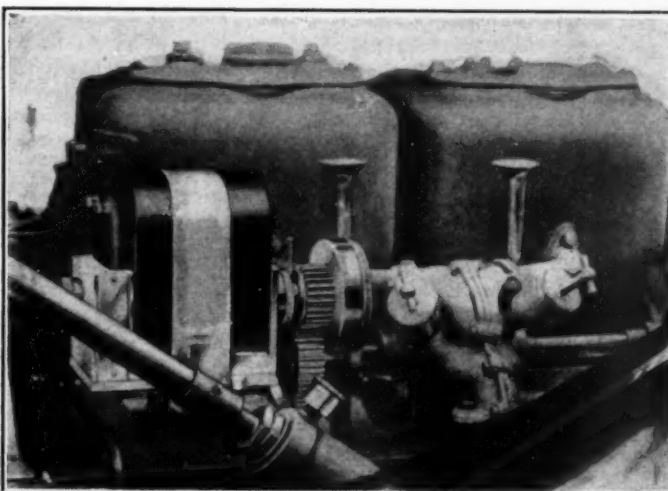


Fig. 9—Showing the Auto-Liter gear-driven lighting system

covered with a pressed-steel door so hinged that it may be opened in either direction, thus making for accessibility.

Regulation is effected through an automatic field rheostat, governing the generator without any other speed regulator and permitting of a positive drive from the engine shaft. Drive is preferably taken from the gear driving the fan, but a somewhat higher rotative speed is used for the dynamo. A silent chain is used for driving the dynamo, and the speed of the latter is at all times proportional to that of the motor. The field rheostat consists of carbon discs laid on one another and held together by springs. The spring pressure is taken off with the increased current output of the dynamo, a magnet armature acting to this extent, so that the resistance in the field circuit is increased and the field exciting circuit is cut down. The surplus current output of the dynamo is automatically directed, by means of a cut-out, to a 100-ampere-hour storage battery. The use of high-grade material and excellence of workmanship have created a

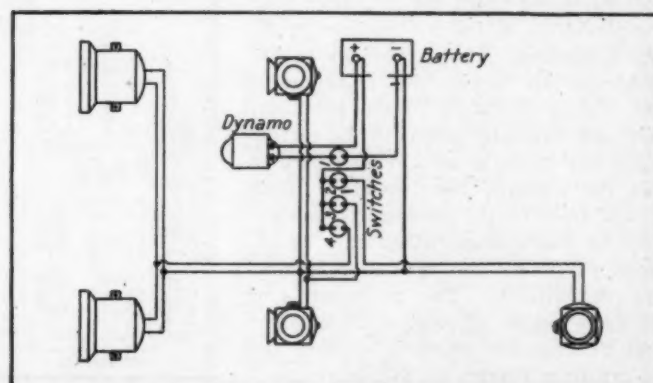


Fig. 11—Wiring diagram of Detroit Electric Appliance system

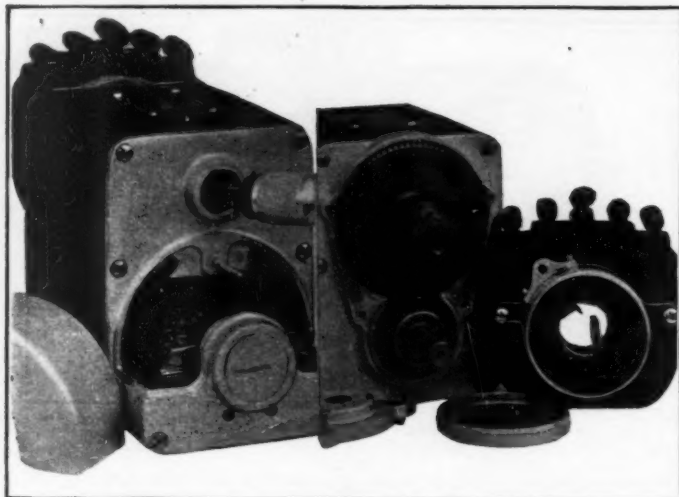


Fig. 12—Electro generator with casing partly removed

ferro-nickel cells being used in the equipment. The type B4 has been used in many outfits sold by the company, and the Edison Storage Battery Company is now working out a type still more suited to the requirements of the Holtzer-Cabot dynamo. It does not matter how battery and dynamo are connected with regard to polarity, as the dynamo automatically takes care of the current flowing in the right direction.

A specially commendable feature of the battery is its freedom from deterioration due to overcharging. The connection between dynamo and battery (Fig. 5) is closed when the former has a speed of about 1,700 revolutions, and if the speed decreases a switch on the line opens automatically, so that a reverse flow is impossible. The governor is a permanent one and need never be adjusted; in fact, the operator need in no way regulate the performance of the lighting system. The battery automatically comes into play when the dynamo is not running and by switching on the lights current is supplied to them by the cells. These are incased in nickel-steel, which is practically unbreakable, and not subject to corrosion. Light weight is another advantage of this type of battery.

### Vesta Has Governor and Rheostat

The Vesta magneto generator is regulated by a governor so constructed as to keep the current constant after reaching a given speed and to make and break the current when the engine starts and stops. The governor is of the centrifugal ball type and works in conjunction with a rheostat located under the heads of the generator magnets, being connected by an arm to a segment plate as seen in Fig. 10. On the connecting arm are two platinum points. The contact arm connects the circuit after the generator has attained a speed of 400 revolutions per minute, conforming to a car-speed of about 6 miles. When the generator first cuts in the circuit the charging rate is from 1-2 to 1 ampere, and with increasing speed the amperage rises to a maximum, which is 6 amperes in the Type 6 machine. At any speed above that producing this output the amperage is held at 6 by the work of the governor, which automatically inserts in the current such a resistance as may be necessary to keep the ampere flow constant. Centrifugal force on the governor is counteracted by two springs, which may be adjusted to govern the resistance inserted into the circuit. The permanent-type fields are made of high-class tungsten steel of desirable magnetic quality, and the armature rotates on ball bearings.

The type 6 charges a 6-volt battery at

a rate of 6 amperes an hour, as soon as an automobile speed of about 18 or 20 miles has been attained. Drive is taken by direct, positive gearing from the engine at double speed of the motor. At 1,300 revolutions the magneto generator develops 6 amperes with a 6-volt battery in circuit. Three 2-volt, 80-ampere batteries connected in series and weighing 40 pounds are furnished by the Vesta Accumulator Company, of Chicago, Ill. A complete line of lamps and lights are also manufactured by this concern, as is a wiring system for adapting Ford T cars for electric lighting. Among the automobile factories which have made the Vesta magneto generator part of the standard outfit for 1912 are the Haynes Automobile Company, the F. B. Stearns Company the Metzger Motor Car Company, the Chalmers Motor Car Company and the Dayton Motor Car Company.

### Deaco Dynamo Runs at Slow Speed

The Deaco lighting system of the Detroit Electric Appliance Company also comprises an electric generator which is provided with a regulator adjustable by the operator of the car, so as to produce the desired amperage. The dynamo, Fig. 11, is so constructed as to deliver to the line 7 amperes at 6 volts, and it consists of a drum armature revolving on ball bearings, and two fields, one being permanent and the other electro-magnetic. Very little heat is produced in this generator and the maker guarantees it against burning out.

The patented regulator used in conjunction with the dynamo has been constructed with a view toward preventing the generation of superfluous current, and works as follows:

To produce the required current at low speeds, an electro-magnetic field is produced which co-operates with the permanent field of the ordinary magnets; at a predetermined higher speed the electro-magnetic field is cut out, so that the only field in operation is that of the permanent magnets. At very high speed, the electro-magnetic field is cut in again, but this time as a resistance weakening the permanent field, in order to keep the current at the necessary amperage. The Deaco dynamo if operated without the regulator, varies in current output with varying speed as follows:

Speed	250	350	450	500	600	800	1000	1500
Amperes .....	1	3½	5½	7	8½	11½	14	18
Volts .....	6	6	6	6	6	6	6	6

While the dynamo generates 7 amperes at 500 revolutions per minute without the use of the regulator the latter may be so adjusted, by simple means, as to deliver this current and no more at any higher speed. This construction permits of charging the storage battery floating on the line at a low amperage and without any danger to the cells. A switch connecting dynamo and battery is used. It is important to disconnect the two elements when the dynamo is not running in order to prevent the battery from discharging.

The dynamo is 10 inches long by 6 1-8 inches wide by 7 3-8 inches high, and its weight is 35 pounds. A wiring diagram of

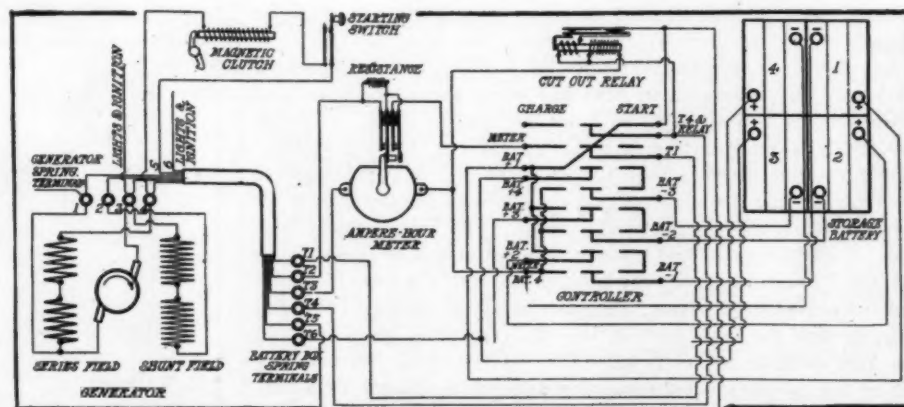


Fig. 13—Wiring system of the Dayton Engineering Laboratories Company



the Deaco system is shown in Fig. 11. Deaco dynamos are standard equipment of 1912 cars made by the Marquette Motor Company, Saginaw, Mich.

Headlights used with Deaco systems have about 16 candlepower, while side and tail lamps use 4 candlepower each. The lighting power of the various lamps is of course not obligatory, but some decision is left to the customer. The battery which feeds the lights while the car stands still has a capacity of 80 ampere hours.

#### Delco System of Threefold Use

The Dayton Electric Laboratories Company, of Dayton, Ohio, after having gained a reputation by many years' work in the ignition field, has now extended the usefulness of its apparatus by adapting it for both illuminating and starting purposes. The diagram of the Delco system which is being installed on every 1912 car manufactured by the Cadillac Motor Car Company, is illustrated in Fig. 13. The dynamo, which is not shown here, is of the shunt-wound type, but the shunt field is normally cut out as series-wound electric motors are the most powerful and as the dynamo has to serve as a motor when starting the engine. Before cranking the motor the electric motor-generator draws upon the battery for this purpose—the clutch is thrown out and the circuit closed between cells and motor. As soon as the latter has started the engine the clutch is engaged, and the generator gears thrown out of mesh with the flywheel, the controller being shifted to normal position in which the battery connections are arranged in parallel. At the same time shunt field, ammeter and cut-out relay are brought into play. After the speed has reached 300 revolutions the dynamo generates current at 6-12 volts. The ammeter which measures the current flowing into and out of the battery is provided with an automatic cut-out preventing over-charging of the cells.

The relay preventing discharge of the battery toward the dynamo when standing idle consists of a cut-out acted upon by a core with two windings running in opposite directions. When the dynamo is running the current flows through the two coils, and that with the greater number of windings, being more powerful, magnetizes the core which attracts the armature, thus closing the circuit at O. If the dynamo stops the current flows through the other coil, reversing the polarity of the core which repels the armature and interrupts the circuit.

The battery is composed of twelve cells connected in series and arranged in four groups giving 6 volts each. By switching the current on for starting the groups are connected parallel, giving 24 volts and 20 ampere hours for the saturated battery, while for lighting purposes the 6-volt current is directed to the lamps. On Cadillac stock cars which are equipped with this system two Gray & Davis lamps of special design are used which are of adjustable focus, and the rest of the lighting system is made up by two dash lights, tail and speedometer lamp.

An electric system for lighting, starting and ignition is also made by Henry Gibson O'Neill, of Detroit. The electro-torque generator, so-called, which is used in combination with a non-

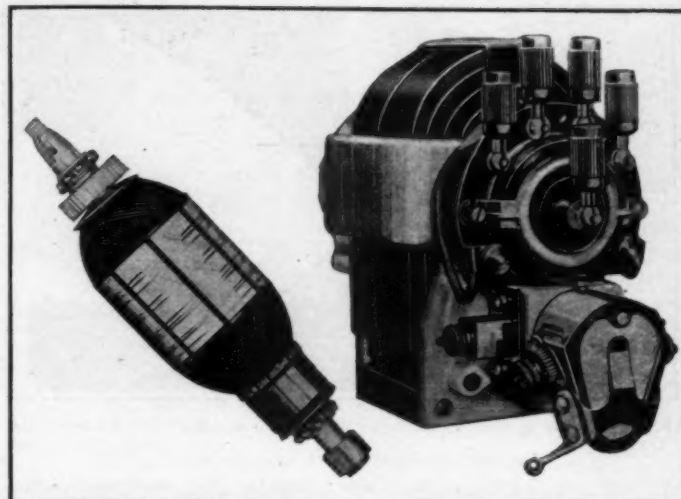


Fig. 15—End view of the Remy lighting magneto and armature

sulphating light-weight battery, is so constructed as to keep cool at all times. It works as a shunt-wound dynamo for lighting purposes and for charging the ignition battery, while for starting work it is transformed automatically into a compound-wound motor. There is, according to its maker, perfect commutation and no sparking at the brushes, even under an overload of 150 amperes. A double-throw multi-pole switch effects the change from multiple charging to series discharging connections, and the charging of the battery and its connection with the dynamo is automatically regulated by a magnetic cut-out. For starting, current is sent into a resistance located in the carburetor and serving as a vaporizer in that it transforms electricity into heat and thereby vaporizes the gasoline.

#### Contrometer Regulation is Original

A new lighting system is made by the Leece-Neville Company, Cleveland, Ohio. It consists of a dynamo combined with a battery floating on the line. The system generates current for both lighting and ignition purposes, the distribution of low-tension and high-tension current being effected by the distributor, called the Contrometer, connected to the dynamo. Front and rear view of the regulating distributor, which carries a switch and plug socket, are shown in Fig. 14. The dynamo which is shown in the same illustration is geared to run at 1-2 times engine speed and automatically regulates the amperage and voltage of its output. The wiring diagram of this system is also seen in Fig. 14 at the left side of the cut. The Contrometer is mounted on a terminal-block on the dash.

#### Hartman Offers Extensive Line

The lighting system of the Hartman Electrical Manufacturing Company, Fig. 19, is a constant voltage system, the full output of 10 amperes being delivered at a car speed of 9 miles an hour. Regulation is effected by weakening the field coils, so that the tendency toward a rise in voltage is counteracted by an automatically introduced resistance in the field. The wiring between dynamo and battery has been so designed that the flow is greatest when the battery is discharged and tapers off as it becomes more fully charged. Whenever the car is running the system generates enough current to serve the lights, ignition, horn and other accessories. The dynamo takes care of the full lighting load at all speeds without deriving any current from the battery, and there is no effect upon the lights even if the battery is disconnected. The generator runs at

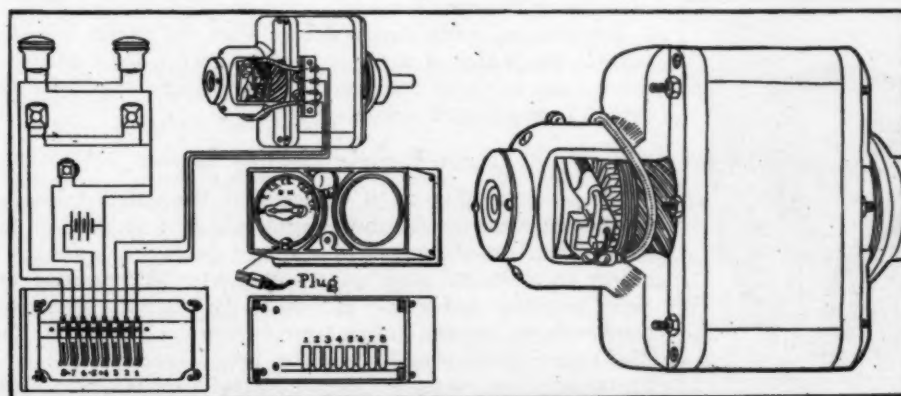


Fig. 14—Leece-Neville's lighting generator and arrangement of the units

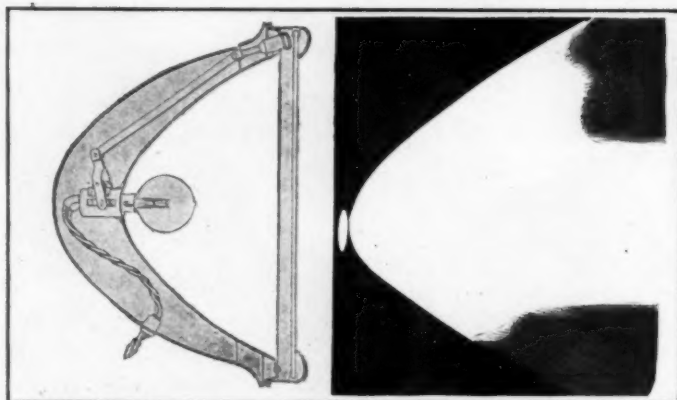


Fig. 16—Gray & Davis parabolic lamps and double light distribution

1.5 times engine speed, and with a suitable coil added to it takes the place of the ordinary magneto. Below 9 miles per hour, however, the current for ignition is furnished by the battery. The regulator which serves to keep up a steady voltage of output also prevents a flow of current from the battery to the dynamo.

The principal changes in this system as compared with last year's model are such as make possible current generation at lower speed so as to permit of its operation under conditions of slow travel in crowded city streets. The lamps have a total consumption of 8 amperes, of which the 20-candlepower headlights use 3 amperes each; two 4-candlepower sidelights consume .6 ampere each, and the 2 or 4-candlepower tail light, .3 or .6 ampere.

#### Dyneto Runs at Crankshaft Speed

The lighting system of the Dyneto Electric Company, of Elbridge, N. Y., comprises a generator and battery outfit, and a set of lamps having candlepower as follows: Headlights, 16 each (3 amperes); dash and tail lamps, 3; side lamps, 6. Dash and tail lights are wired in series, while the wiring of the side lamps is optional with the user. The dynamo is driven directly and positively from the engine, either by gearing or chain drive, and may be located on frame side member. The total weight of the dynamo is 19 pounds.

An automatic switch connects battery and dynamo, and when the latter is in operation the shunt winding is automatically cut out. The connection between the two units is such as to charge the battery at a low rate when its capacity has almost been reached, but at a high rate when the battery is almost exhausted. The governor regulates the current output, making the supply equal to the demand in all cases. The arrangement of leads is simple, as Fig. 18 shows.

#### Adlake Dynamo Regulated by Lamps

The Adams & Westlake dynamo, Fig. 26, is shunt-wound, and delivers a constant current, regardless of the speed of the car.

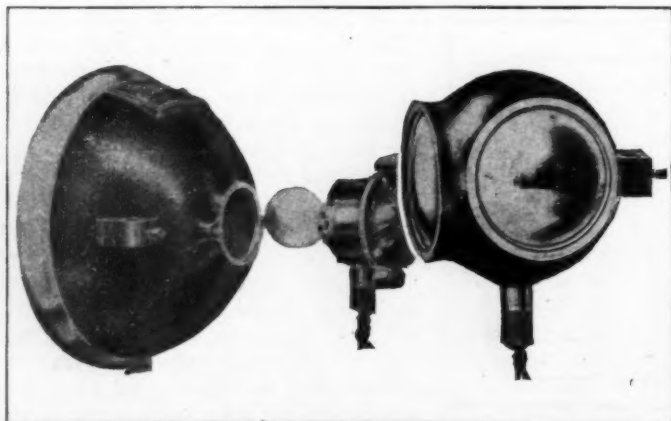


Fig. 17—Milwaukee electric lamp with removable central socket

The dynamo load is automatically increased or decreased with increasing or decreasing lighting load, this being effected by means of the Adlake-Newbold regulator, which has but three moving parts, all of which are enclosed in a strong metal box. This regulator keeps up the balance between dynamo and lights, when these are being used, and between the dynamo and battery in daytime. Besides, it serves to disconnect the dynamo from the lighting circuit when its voltage falls below normal.

#### Rushmore of Bi-Polar Cylinder Form

The Rushmore dynamo, Fig. 24, delivers a constant current of 13 amperes at 6 volts; this on its way to the lights passes through the battery which is thus floating on the line. The current production is the same in the two sizes of dynamo made by the Rushmore Dynamo Works, of Plainfield, N. J., but they differ in their speed of operation, one type running at engine speed and the other at twice or two-and-a-half times the same. The smaller size has a diameter of 5 1-2 inches and an over-all length of 8 1-2 inches. Both types are of the iron-clad, bi-polar cylinder form.

The dynamo delivers a constant amperage, the voltage being determined by the battery, it being the voltage required to produce the designed current against the resistance of the battery and the lighting circuit. The maximum voltage of the current flowing through the lamps is not so high as to injure the fila-

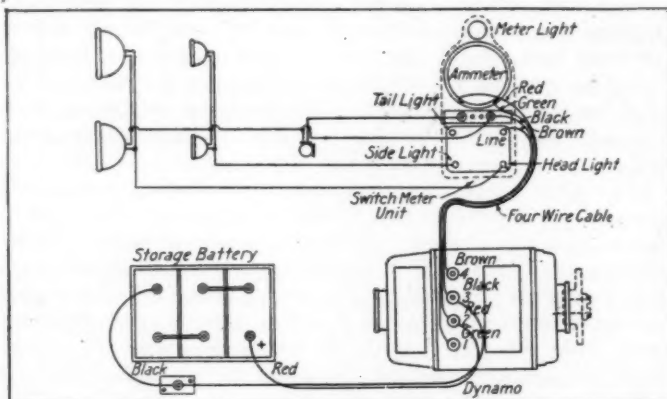


Fig. 18—Wiring diagram of the Dyneto illuminating outfit

ments. The dynamo cuts in at 200 revolutions per minute and produces the current of the required amperage and voltage. The former rises rapidly up to 600 revolutions, when the output is about 10 amperes. This is plenty of current to keep the lamps burning and a surplus is stored in the battery, which consists of three cells having a total weight of about 75 pounds. Either an 80 or a 100-ampere-hour battery is supplied.

The amperage is practically constant at speeds higher than 1,000 revolutions, in that it rises slowly above 600 revolutions per minute. It is never more than 13 or 14 amperes, and it is hardly changed at all by switching on or off the entire number of lights on the car.

The dynamo, being always driven when the engine operates, charges the battery at a normal rate, and when the capacity of the battery has been reached the field circuit is automatically broken to avoid overcharging of the cells.

#### Hoyt Electric Lighting System

The generator, Fig. 25, is connected to the battery by means of the automatic mechanical control, which is located on the dash. This control apparatus permits of the battery receiving a charge up to its full capacity and interrupts the connection between generator and battery as soon as the latter has been saturated with the current-flowing thereto from the generator. The discharging gear, placed upon the line between battery and lights, regulates the battery output, so that after the battery has been exhausted to a certain extent, but not wholly, it is replenished by the current generated by the dynamo. An auxiliary gear



is also provided whereby current is supplied to the lights if the battery is almost exhausted. The Hoyt system is manufactured by the Hoyt Light Sales Company, of Indianapolis, Ind.

### Magneto Much Used for Lighting

The advantage of deriving all the electricity used on a car from one source has been recognized of late and its effect may be seen by the many systems above described, where a dynamo supplies current to a battery system which also feeds the ignition wiring system, as for instance in the Delco apparatus. Remembering that the magnetos used on many cars are quite capable of delivering more power than is needed to produce the jump spark necessary for igniting the mixture in the cylinders, the idea of adapting powerful magnetos for lighting the lamps on a car was the expression of a logical desire, and several manufacturers of magnetos have adapted ignition magnetos, by proper wiring and switching, to illuminating work.

It is characteristic to note that in this field of endeavor Ford cars range among the pioneers—for there is little reason for the assumption that the practice of adapting the magneto for illumination will not grow. The Ford system of using the magneto for road lighting purposes will be described below, considering for the purpose the Model T Ford magneto, which is similar in construction to the K-W magneto, and therefore may be similarly adapted for lighting.

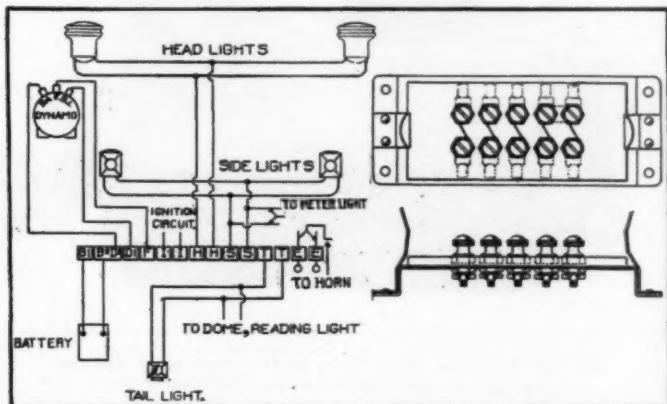


Fig. 19—Wiring diagram and junction box of Hartman system

The equipment needed for adapting the Ford magneto consists of two 8-inch headlights with parabolic reflectors of 11-8 inches focus, two 2 1-16-inch tungsten, 20-candlepower bulbs for same, 12 feet of wiring soldered to the lamps and ready for use and a switch which is mounted on the dashboard. The manner of installing the equipment is seen in Fig. 23. Connection is made from the magneto through the top of the flywheel and the switch to the headlights and thence grounded to the magneto, with another connection leading from the magneto to the master vibrator and thence to the coil. From the coil the connections are made to the individual cylinders and thence back through the frame to the magneto.

The K-W master magneto regulates the ignition, taking the place of the separate vibrators in the coil, and representing in their place one fast-acting vibrator and condenser, thus insuring perfect synchronism. The master vibrator need not be included in the system, but the maker recommends its use with a view toward improving ignition conditions in the motor. The lamps used on the Ford outfit are of the 6-volt 2-ampere type. A battery may be used; it is connected to the vibrator as shown in Fig. 23.

The K-W Ignition Company, of Cleveland, also makes a standard road lighting outfit, comprising a low-tension magneto, switch headlights and bulbs, speedometer light and wiring to make connections between the units of the system. Connection may be made to a master vibrator supplying the ignition system. Headlight lamps of 16-candlepower are included in the outfit made by this company.

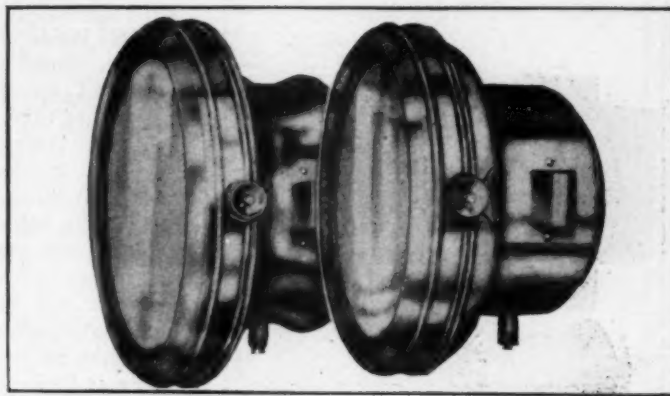


Fig. 20—Two types of B. & L. electric headlights

### New Remy Combination System

The Remy Electric Company, of Anderson, Ind., has recently introduced its magneto-light system, made in two models, A for six-cylinder and B for four-cylinder cars. This system, like the majority, combines the use of a generator with that of a storage battery floating on the line. When the motor is stopped the storage battery furnishes current for the lights.

The magneto, Fig. 15, is a combination constant direct current generator and ignition device. The armature is drum-wound on a laminated iron core and revolves on ball bearings. The current is collected from the armature by two large carbon brushes, carefully fitted to the commutator surface. Permanent contact with the commutator is assured by means of a compression spring back of the brushes. A flexible cable is firmly attached to the brush and brush-holder terminal, insuring a positive connection. The amperage is held constant by automatically varying the current in the shunt-wound, exciting or field coil around the magnets, thereby increasing or decreasing the intensity of the magnetic field to compensate for the varying speed of the magneto.

The dash coil box is of solid mahogany, highly polished. With the magneto and storage battery, this coil box completes the system, as the regulator, coil unit, vibrator, ignition and lighting switches are placed compactly within it.

The regulator inside the coil box holds the current at 8 amperes. It consists of an electro-magnet, actuating an armature which increases or decreases the pressure upon a column of carbon discs. As the discs loosen resistance in the field circuit is increased, holding the output at 8 amperes.

With this system there is a 70-degree timing range. Since there is a constant direct current, the spark is of the same intensity at any point in the timing range. The timing of the spark is accomplished by shifting the circuit breaker around the armature shaft to which is attached the circuit-breaker cam. The current is interrupted by the circuit breaker and is then carried



Fig. 21—Apple company's electric side and tail lamp

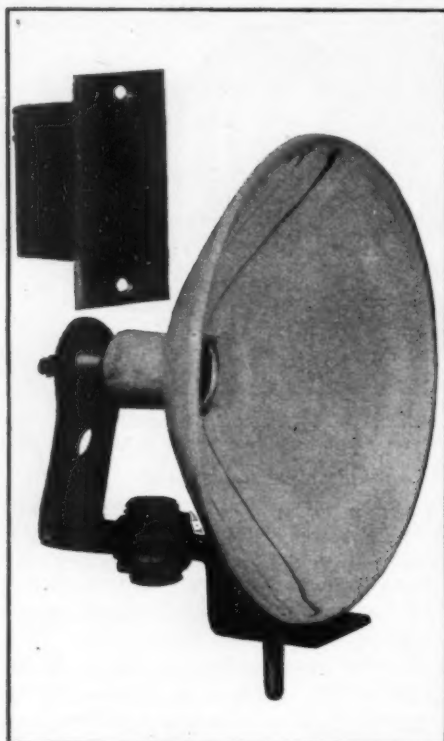


Fig. 22—General Electric Edl-Swan socket and push button

eral professional racers, on various courses and at very high speeds, and has not failed even under these trying conditions, but continued to produce a steady and reliable light on the headlights as well as on the other lamps.

#### Auto-Liter Has Distributing Box

The Auto-Liter, which is made by the Electric Auto-Lite Company, of Toledo, O., is also constructed on the lines of the lighting magneto. The manner in which it is installed on the automobile is seen in Fig. 9, where it is driven by reduction gearing. However, chain or belt drive may be applied with no different result.

The generator is fully inclosed, as may be gathered by referring to the illustration, and the handling and installation of the system is very simple. Two No. 12 wires connect the generator (which is self-contained and automatic in action) to the battery, which acts as a regulator and distributor of the current produced by the dynamo. Connections lead from the battery to the terminal box, which is of special construction and contains all the distributing wiring necessary to lead current to head, dash, tail and speedometer lights, as well as to the engine cylinders. Control is by push button installed on the dashboard. The lamps furnished with this outfit have 16 candlepower for the headlights, while side and tail lamps have about one-fourth the capacity of the big lights. The battery included in the system is charged at a rate of 6 volts and has a capacity of from 80 to 100 amperes.

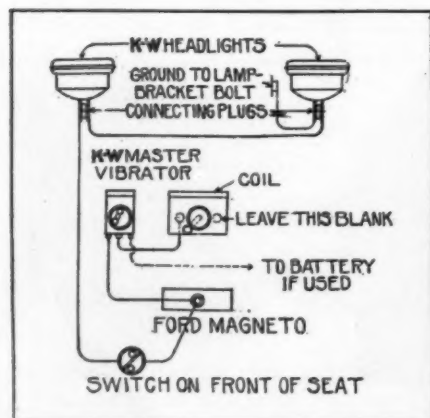


Fig. 23—Wiring system of K-W Ford equipment

to the transformer coil unit inside of the box, where it is stepped up or transformed to the high voltage necessary at the spark plugs for ignition. The high-tension impulses are carried back from the coil to the high-tension distributor on the magneto and thence properly distributed to the spark plugs. The magneto is so designed that it may be driven in either direction, that is, clock-wise or anti-clock-wise, without any change.

The Remy magneto light equipment has been tried out by the company's drivers as well as by several

#### Perfection System Serves Many Ends

The production of sufficient current to not only light the lamps, but also fire the cylinders, actuate the electric horn and serve wherever small quantities of electricity are required was the keynote followed by the Economy Manufacturing Company, of Economy, Pa., in the construction of its Perfection lighting system. The charger is a generator of the magneto type, composed of very few parts so assembled as to keep them from exterior moisture, which would tend to produce rust on them. The permanent magnets are made of highly retentive steel and as the strength of the magnetic field is the same at both high and low speeds no excessive currents are produced. The current produced by the magneto flows to the battery, which acts as reservoir and balancer for the whole system, insuring a 6-volt flow at all times. When the car and magneto are operating the switch on the line directs as much current to the lights as they require, while the surplus flows to the battery, where it is stored. Cutting out the magneto by stopping the engine switches the battery onto the lights. The battery has a capacity of 100 ampere-hours and will serve from five to seven tungsten lamps having a

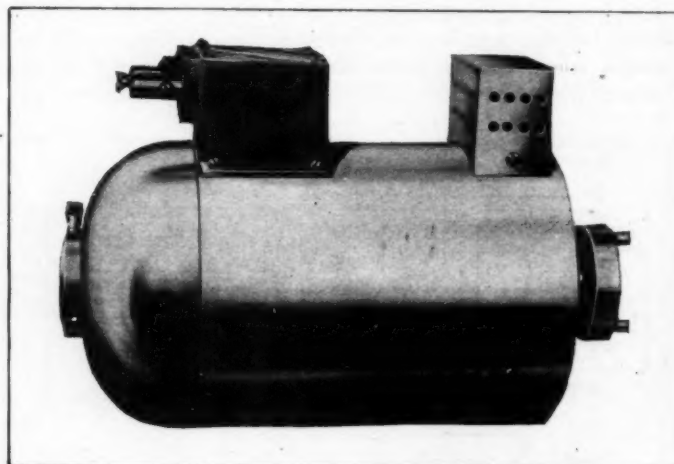


Fig. 24—Exterior appearance of the Rushmore dynamo

total of 50 candlepower for a period of more than 10 hours. The wiring diagram is given in Fig. 8.

The capacity of the battery is sufficient to also provide a hot enough spark for each cylinder, since the cells are constantly being recharged by the generator. The winding is wedged in insulated slots, so that the use of band wires is avoided. Armature and commutator are pressed upon a steel shaft under heavy pressure. Automatic regulation is obtained by the use of a cut-out which is controlled by a mechanical governor and at a predetermined speed interrupts the circuit, thus cutting down the rotative speed.

#### Electro Uses Electro-Magnets

The equipment manufactured by the Electro Lighting Company, of Indianapolis, Ind., is again illustrative of the trend toward the combination of ignition and illuminating generators. The dynamo, Fig. 12, in this case is a direct-current machine and revolves at crankshaft speed, so that direct and positive drive by gear or chain can be used. Excepting for the feature of having electro-magnets in place of permanent ones, the generator differs little from a magneto. This construction goes hand in hand with the advantageous possibility of producing an equally hot spark with the magneto in an advanced, normal or retarded position, whereas with an alternating current machine—with the common magneto—there is but one relative position of the magnets and armature in which the maximum effect is produced. The dynamo operates above a speed of 200 revolutions, below which the storage battery supplies current, directing exactly as much electricity toward lamps and cylinders down to 150 revo-



lutions as at higher speeds. Among the refinements of the system the waterproof cover incasing the commutator brushes deserves mention. The high-tension distributor is on the end opposite the commutator and by undoing two screws it may be taken off, together with the circuit breaker. The control mechanism, consisting of two magnetic switches, is contained in a coil box on the dash, where the ammeter, too, is located. The meter is illuminated by a small frosted bulb under the dial.

#### Berdon System Resembles Magneto

The Berdon system for combined lighting and ignition is made by the Esterline Company, Lafayette, Ind. It generates its current by a positively driven direct-current dynamo which is connected to a storage battery. On the line between them is installed the automatic controller which insures the voltage to keep within a predetermined range. The dynamo is directly connected to the motor, being driven by gears or silent chain, and is furnished with an ignition equipment which may be used or disconnected at will. The controller regulates the flow to battery, limiting it to the normal charging rate even when the dynamo runs at high speed, and when the dynamo voltage is less than

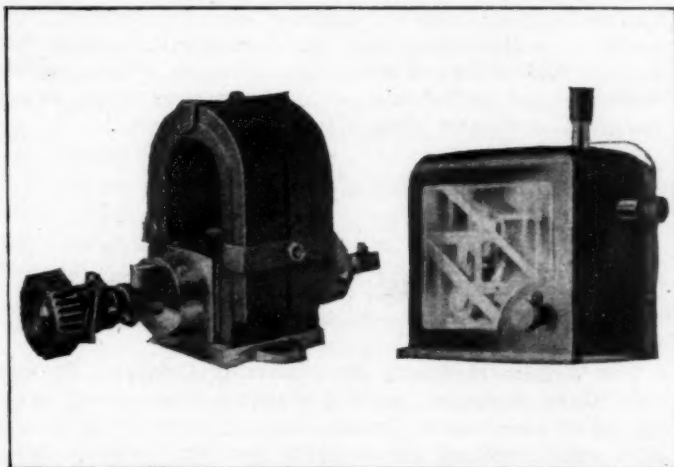


Fig. 25—Hoyt lighting dynamo and dash controlling box

reaction between the field of the magnet and the current in the that of the battery the two units are automatically disconnected. The controller consists of a permanent magnet placed over a die-cast metal case into which its pole pieces project. These poles are surrounded by a pair of coils which may move relatively to them. The whole mechanism is closed by a cover plate which prevents dust and moisture from entering the case. The coils moves the latter when current flows through them. The controller opens all electric circuits when the current is zero, and draws none from the battery, so that with the dynamo at rest or running below the cutting-in speed the connection between battery and voltage is open, but as soon as enough current is produced to charge the battery the controller, which is designed to effect this end, closes the circuit between dynamo and battery. The battery is of the 80 ampere-hour type with the smaller outfit, while the larger requires a 100-ampere-hour battery.

A four-point back-connected switch, the stem of which extends into the controller case, permits of turning on all the lights or any one set of them independent of another. A junction box is furnished with the equipment, in which all connections are made, so that in installing the system on the car one has but to connect wires as marked. The two sizes of generators made deliver 7 1-2 amperes at 6 volts and 12 1-2 amperes at the same voltage, respectively.

#### North East System Lights and Starts

The North East Electric Company, of Rochester, N. Y., also manufacture a system applicable for lighting, starting and ignition work, thus combining these features in a similar manner

to the Delco system. The generator is of a compact design and so connected with the engine as to give a suitable gear ratio both for starting and lighting purposes. The only moving part of the generator is the armature which runs on annular ball bearings. No governors of any type are used. The brushes are made of a special material which is highly conductive and strong enough to serve for a long time.

The coils are treated with an oil and moisture-proof compound; the battery has a capacity of 80 ampere-hours, and regulation of the current for the various purposes is effected by means of a specially designed lock switch which is mounted on the dashboard of the car. The method of wiring is shown in Fig. 28, and the current generated is sufficient for a production of 125 candlepower, the voltage of the current being 6.

To start the car, the spark and throttle levers are placed in the same position as if the car were to be started by hand; then the starting switch is moved, by the driver's foot, to the starting position in which it is held. The connection thus made allows current to flow from the battery to the generator which is made to act as a motor and turns over the crankshaft. After the engine has started the switch is released and automatically returns to its normal position. At the same time the generator begins to function as a dynamo, charging the storage battery with the surplus current not used by the lights in the night, or with the full output in day-time.

The North East type of system which is designed for lighting purposes only differs from the combination system by the simpler method of wiring and the obviation of the starting switch. The manner of arranging the units is illustrated in the right-hand half of Fig. 28.

A short review of the lamps which the market affords naturally focuses attention upon the headlights which are now being used on automobiles, these being the most important lamps so far as road illumination is concerned and, being most visible to the

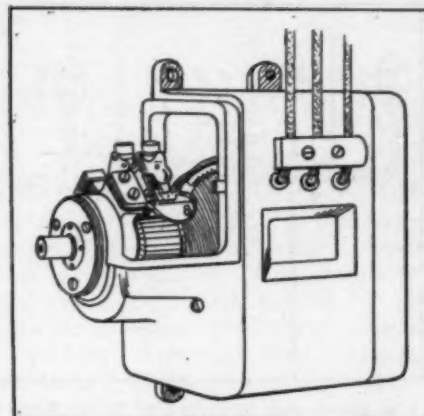


Fig. 26—Adams & Westlake electric generator

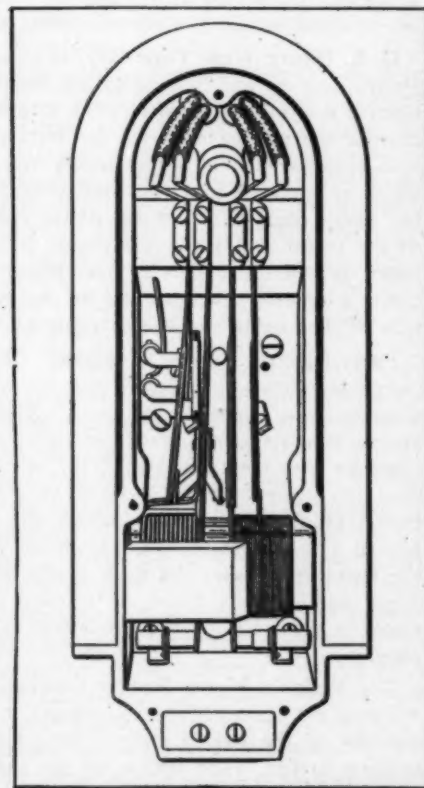


Fig. 27—End view of the Berdon car lighting generator

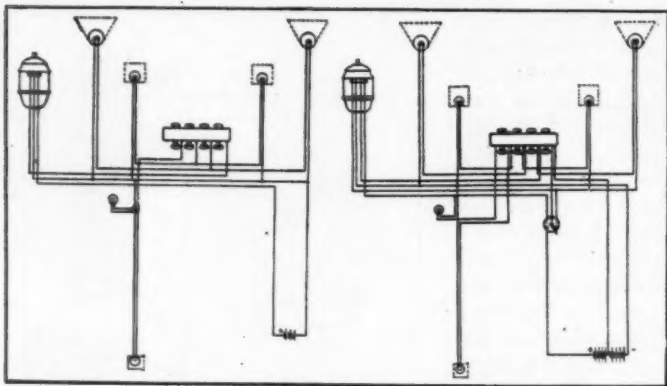


Fig. 28—Wiring diagrams of North East system for lighting and combined lighting and starting

passers-by, must necessarily be of pleasing appearance. Furthermore, they must stand out as efficient sources of light which lend safety to speedy travel during the hours of night. Among the types here illustrated is the Gray & Davis lamp of a simple parabolic design of casing and reflector and distributing the light in the form of both fan and pencil rays, as illustrated in Fig. 16. The headlight of the Milwaukee Bronze Casting Company, Milwaukee, Wis., has the distinguishing characteristic that in replacing the bulb one need not remove the front glass of the lamp, but has merely to take the socket out of the rear center

of the lamp, Fig. 17. The simple and extremely beautiful design of the Apple lamps is illustrated in Fig. 21. The conduit is attached to the rear center of the lamp, while the bracket holders are harmoniously arranged at the sides. Fig. 20, which illustrates the product of the B. & L. Auto Lamp Company, New York City, is likewise indicative of the trend toward simplicity in design. Most electric lamps now made are hermetically sealed so as to exclude dust and foreign matter which otherwise is apt to settle on the bright surfaces of the reflector, thereby decreasing its efficiency.

Acetylene lamp makers, in order to keep in the procession, have had to adapt themselves to the altered conditions. The acetylene system of today is in many cases entirely automatic. The admission of gas to the various lamps is regulated from the dash, as is the height of the flame; at the same time a current from a set of dry battery or storage cells produces a series of sparks at the burner, so that the gas is ignited without the slightest discomfort to the driver. All this may be done by two movements, or in some cases only one, of the driver's hands; and there are many that prefer the brilliancy of the acetylene lamp to the electric light. The necessity of cleaning the lamps has been reduced to an almost negligible quantity. All told, the electric lighting system makers have found the acetylene people to be alert competitors, and if electric illumination will hold the field in the end it will take some time until it reaches that state, and not before it will have overcome a very strong resistance on the part of the acetylene light makers.

## Very Latest Things in Self-Starting Devices

SO RAPID has been the development of the self-starter that in the issue of January 4 some of the more recent additions to the list were necessarily omitted. A careful supplementary review of the field has brought to light the following concerns engaged in manufacturing these devices:

**G. L. Henry, New York City,** is manufacturing a combined electric starting and lighting system which is known as the auto-electric system. It consists of a magneto-dynamometer which charges the storage batteries for starting the motor; the magneto-dynamometer is automatically transformed into a motor which is operated from the storage-battery current. The electric motor engages at the will of the operator with the flywheel of the motor and starts the engine in this manner; when the motor is running under its own power the electric motor becomes a dynamo-generator and its energy is devoted to the ignition of the engine and the charging of the storage battery.

**Paris Electric Starter Company, Chicago, Ill.**—This company's products are designed with an eye to simplicity and the elimination of unnecessary parts. The lighting and starting system consists of a motor-generator and transmission. The complete equipment outside of the storage battery weighs less than 100 pounds. The pressing of the multiple-point contact button cranks the engine through the transmission, which is geared 3 to 1. As soon as the motor runs on its own power the operator releases the push button and the motor is disengaged automatically from the starting device and the starting motor is automatically thrown into a 3-to-1 ratio and acts as a generator.

**The Reliable Motor Starter Company, Springfield, Mass.,** is bringing out an acetylene self-starter with which only a small quantity of the gas is injected into the cylinder, which is in position to fire. The button on the spark coil is then pushed and the charge is exploded in that cylinder. The gas is not sent to all the cylinders as is generally the case. The starter will work in conjunction with any acetylene system.

**The William N. Stacey Manufacturing Company, Springfield, Mass.,** makes a combined acetylene starting and lighting system known as the Perkins. A controller is located on the dash which regulates the supply of acetylene from the tank. There are three levers on the dash control, which regulate the acetylene starting device, the headlights and other lights.

**The Thompson Automobile Company, Plainfield, N. J.,** is making a self-starter which bears the name of the company. The starter is of the acetylene type in which a given amount of gas is injected into the cylinders and an explosive mixture is formed. The motor then starts on the spark. An ingenious push-button valve features this device. It is so constructed that the gas is measured automatically in conjunction with the pressure in the acetylene tank. In this manner the same amount of gas and the same quality of charge is always fed to the cylinder.

## Radiators

SEVERAL radiator manufacturing concerns were overlooked in the résumé of such exhibits in the issue of January 11. Among them were:

**The A-Z Company, New York City**—This company makes a square tube type of radiator in which the tubes are spaced with thin strips of brass running from top to bottom of the radiator section. The tubes are 1-4-inch square. An important feature is the straight water channels which insure constant circulation. The company also manufactures hoods and mud-guards of all suitable materials as well as manifolds.

**McCord Manufacturing Company, Detroit, Mich.**—The cellular radiator made by this company consists of a series of vertical metallic strips crimped or pressed into 1-4-inch squares and separated by flat strips so formed as to maintain a proper water space between them. The strips are soldered, front and back. The company also makes the McKim gasket.



## Manufacturers of Motors and Motor Parts

**W**HILE the various valveless types of motors naturally attracted much attention at the shows, the exhibit of poppet-valve motors came in for no little favorable comment by reason of the manifest refinements of the new product. The following, along with some creditable showings by motor parts makers, were noted:

**Lindhe Shim Company.**—The Lindhe shim consists of a series of thin brass layers held together by a metallic binder. Each layer is easily peeled off after loosening one corner of a layer with a sharp instrument. The layer having been removed, a perfect surface is at once obtained without filing or rescrapping, and the rest of the shim is not affected in any way by the removal of individual layers. It is made in stock sheets 6 inches wide by 3 feet long and with the various thicknesses called for by the B. & S. standard sheet metal gauge. Sectional sheets of any given thickness can be made to order. While this shim combines the flexibility of the loose-leaf shim with the strength of the solid-block type, it has the additional advantage that one stroke of the press furnishes the same result in the case of this type of shim, as requires a great number of strokes in the case of a looseleaf shim.

**Northway Motor & Manufacturing Company, Detroit, Mich.**—The motor of this company is a four-cycle poppet-valve design of the four-cylinder type. It is made in two dimensions, Model 19, 4 1-8 by 4 3-4 inches, and Model 26, 4 1-2 by 5 1-4 inches. In both cases it is constructed in unit with the cone clutch and the three-speed-and-reverse gearset. The motor is of the L-head type, water-cooled and lubricated by a circulatory splash oiling system. The sight-feed on the dash may be regulated to show from one drop per 50 revolutions to any number of drops for this travel, including a continuous stream. The oil reservoir may be inspected upon removal of one of the several oil-plugs in the crankcase, the plug hole containing a ball floating in an open slot and always being on the surface of the oil. On its way the oil is strained before it passes through the dashboard sightfeed. A Schebler carbureter is used in this unit power plant, and the magneto, too, is of a standard make. All nuts and bolts are of special high-grade alloy steel.

**F. W. Spacke Machine Company, Indianapolis, Ind.**—This concern exhibited a compact motorcycle engine, having one-piece crankshafts, and one-piece crankcases, the latter being combined with a cover which is ground to a bearing. The magneto and

valves are driven by silent halftime gears of the spiral type, which are of hardened and ground alloy steel. The oiling system is of the forced-feed type, every drop of lubricant being forced to pass through the crankpin bearing. A connection between valve-gear chamber and flywheel catch ring insures the returning of all the oil into the crankcase. The large nickel-steel valves seat on cast iron. Annular ball bearings carry the crankshaft, the connecting-rods being provided with takeup caps for the adjustment of the bearings.

The same company showed a full line of its N. & R. air compressors, which are made for either air or water cooling. Characteristics of this class of equipment are the metallic-spring packed pistons, the pistons, rings and cylinder bores being lapped and accurately ground. The large bearings are bushed with high-grade anti-friction metals. All pinions are made of rawhide to give silent performance of the apparatus. The valves and their cages are easily removed for regrinding or cleaning, without the necessity of disassembling the entire machine. A feature worthy of mention is the small cylinder clearance, which tends toward increased efficiency in a machine of this kind. All sizes compress air to 125 pounds per square inch, they range in capacity from 3.067 to 9.201 cubic feet of free air per minute. The crankshaft speed is 150 revolutions per minute in all sizes.

**Spicer Manufacturing Company, Plainfield, N. J.**—The universal joints exhibited by this company are designed for severe conditions of service in pleasure and commercial car work. The product being rather well known, it remains to state that recent improvements have been along the lines of refinements, toward a higher standard. Strict standards of accuracy are maintained in all steps of the manufacture of these joints.

**Wasson Piston Ring Company.**—This concern manufactures a concentric ring which is of uniform thickness at all points and which has been treated in an automatic machine permanently expanding it so as to make the outward radial pressure equal at all points. The effect of the Wasson concentric ring is its forming a gastight joint between the cylinder and piston, so that the gas reservoir ordinarily formed between piston and the thin portion of an eccentric ring is obviated and smoking and carbonization of the rings avoided. The excessive oil rising from the crankcase always travels along the inside surfaces of the rings till it reaches the top.

### Chains

**A**MONG the chain makers whose products attracted attention at the recent big shows were:

**Diamond Chain & Manufacturing Company, Indianapolis, Ind.**—This company makes all sorts of chains, including various detachable kinds. The special feature of the line, however, is the use of chrome nickel-steel side bars with nickel-steel rivets in the Diamond chrome nickel-steel chains. The company also manufactures the Diamond repair link for effecting a quick repair of a broken link.

**Link-Belt Company, Philadelphia, Pa.**—The Maximum silent chain made by this company has rotating pins which distribute the wear on the bushings instead of on the sides of the links. This increases the life of the chain and insures constant efficiency. The chain drives magnetos and camshafts.

**Yale & Towne Manufacturing Company, Stamford, Conn.**—Among the automobile fittings and accessories produced by this company is the Triplex chain block for garage use. Hung from a trolley and running on an overhead track, it picks up the whole automobile or any part of it. The company also makes Duplex and Differential blocks.

### Signals

**I**N the rush of going to press mention of these makers was omitted from the article on Horns in the January 11 issue:

**Mutual Accessories Company, New York City.**—The Oneita is an electric horn of the vibrating class and characterized by the arrangement of the vibrator, which is placed between the magneto and the diaphragm. This simplifies the construction of the horn and permits of embodying in it more pleasing outlines than otherwise; incidentally, the use of a plunger becomes superfluous by this arrangement. A larger hammer vibrates a 5 1-2-inch diaphragm held under considerable tension, which produces a deep and clear sound. The company also showed a combination electric and bulb horn, as well as a locking pedal for operating the cut-out or exhaust signals.

**Riley-Klotz Manufacturing Company, Newark, N. Y.**—This company exhibited a line of horns, including the well-known Nightingale whistle. This is constructed along lines similar to the locomotive steam whistle and is operated by the exhaust, being clamped to the exhaust pipe and controlled by a cable and spring-controlled valve. At the same stand a variety of mechanical-bulb-horns were shown.

# Valves

## Tendencies and Design

**T**HE NON-POPPET, or valveless motor, has come to stay. This is an acknowledged fact, and while they who have worked as pioneers for the introduction of the new type of engine have begun to rejoice over whatever success has been achieved until now, the representatives of poppet-valve designs have at least muffled their formerly violent arguments against the newcomer.

Perhaps the very fact that non-poppet, and especially sleeve-valve, motors are combinations of two old ideas and not entirely new creations is responsible for their quick success. If, instead of a sleeve, Knight had employed a valve on hitherto unheard-of lines, it would have been much more difficult than it was for him to prove the actual merit of his construction. Be that as it may, there seems to be little doubt now that the design of non-poppet valve motors is a step in the right direction.

Progress embodied in these designs is expressed by their increased silence of performance, as well as by greater efficiency. The elimination of a poppet-valve in the design of a motor will immediately reduce noise because there is more lost motion in a poppet-valve than in any other type. As the valve closes, the mushroom and lower tappet-rod end return with considerable noise to the positions dictated by gravity. Furthermore, the valve springs adjust themselves to the lifting stresses, and, after some time, have to be tightened; otherwise, they will lag at high speeds, and the valves will close late, with a proportional decrease of efficiency. Both lost motion and decrease of efficiency at high speeds are easily prevented in non-poppet motors, because of the positive operation of the valves. Another means of reducing noise is the use of spiral gears or silent chains in place of the bevel gears generally used in poppet-valve motors.

Although the Knight motor is the only commercial type today, there are few engineers so fanatic as to pronounce this design the ultimate form of internal-combustion motor. If such there are, it may be interesting to know that Knight does not stand among them, but recognizes that finality in automobile engines is not as yet, despite the progress he has made. No

one knows today which type of motor, poppet or non-poppet valve, will be in the lead a decade hence, nor which type of valveless motor will find favor with the majority of motorists as developments progress.

This point is of little import, too, as the best type is bound to surpass the others in the course of time. All that is necessary for the present is to keep well informed of the virtues and disadvantages of the several types lest, by chance, a good design be blocked in its progress for years, to the common loss of the industry and the public.

### Five Types of Valveless Motors

Speaking of valveless motors, this expression denotes by no means the absence of valves, but merely replacement of the poppet by another type of valve. Practice has shown that it is impossible to obtain satisfactory service of an engine operating without any sort of valve, especially in the case of an engine doing such hard work as an automobile motor.

Non-poppet valve gasoline motors may be classed under five headings, according to the valves used for regulating the flow of charge and exhaust. The first group comprises the sleeve types, such as the Knight, Argyll (Pic-Pic) and C. L. C. Among these the Knight type is the only design using two sleeves, with a consequent advantage in obtaining quick opening and closing of ports. To make up for this shortcoming, the Argyll motor uses a sleeve with five slots cut in it, so that the flow of gases through the ports is an intermittent one. The advantages and disadvantages of this type have not been determined as yet. The C. L. C.'s single valve is of the rotary type and has one slot registering alternately with an inlet and an exhaust port. This principle necessitates the use of an L-head design, owing to the quick succession of exhaust and intake strokes. In the present Knight motor the valves are disposed on opposite sides, but the design could no doubt be adapted to a different arrangement. The Broc motor is another representative of this type.

The second type of non-poppet valve motor is the rotary cylinder design in which cast-iron cylinders are so bored as to make communication, at certain intervals, between cylinder and manifolds. The Mead and Darracq motors use horizontal cylinders rotated at half speed, and the Darracq is especially noteworthy for the use of a single cylinder-port and a D-bored rotating cylinder for the valve. This arrangement also makes the L-head design obligatory. The Mead valve idea comprises two overhead rotating cylinders, straight bored, one for the intake and the other for the exhaust valves. The Itala motor has one rotating plug or short cylinder for each working cylinder, the plug being bored and supported against thrust in an ingenious manner, and being arranged accessibly. The Elmore motor also belongs to this class, since it uses a rotating distributor cylinder.

The third class comprises the ring-valve motors, the Cid using a rotary ring, while the Reno-Bois design, which is identical with the Sphinx motor in America, applies a split ring which is reciprocated by a bellcrank lever alternately uncovering inlet and exhaust ports in the cylinder. The Cid has the two cylin-

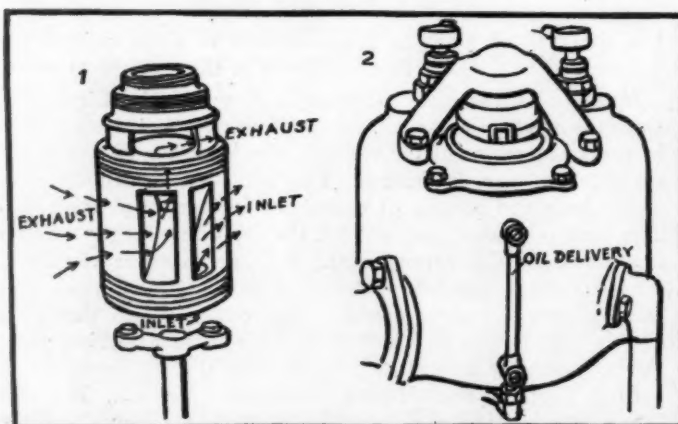


Fig. 1—Itala rotary cylinder valve. Fig. 2—Casing inclosing Itala valve and arrangement of oil lead



der ports arranged within 90 degrees around the cylinder periphery, and as a result must have its manifolds located to conform with this feature. Little more flexibility is found, in this respect, in the Reno-Bois design, which takes in a disadvantageous detail by using a spring for returning the split ring to its upper position. The use of a spring, lubricated by splash, brings in the possibility of seizure, of ill fame in poppet-valve motors.

Of the fourth class, containing the disk-valve motors, the Reynolds motor is the most important representative. There are undeniable possibilities in this design as it permits of positive, silent operation, efficient cooling and ample lubrication. Incidentally, a small valve is used to serve both inlet and exhaust for each cylinder, so that the cost of manufacture ought to be comparatively low.

The Hewitt design is practically the only representative of the piston-valve class of motors. Though not commercially exploited so far, it is said to have given satisfaction from an engineering point of view. The problems of cooling and lubricating are perhaps easier to be solved in this type of motor than in any other, and the use of three reciprocating elements to one working cylinder equalizes the torque to a remarkable degree, according to the parties who have worked with this motor.

In considering the characteristic features, the advantages and setbacks of the five types of motor, it will be to the point to begin with the Knight motor, as it is the first valveless motor to be commercially introduced to the motoring public, and because its manufacture has been taken up by a number of prominent factories here and abroad.

#### Knight Double-Sleeve Valve

The Knight motor, used with no essential modifications in ten types of automobiles in America and Europe, consists of a set of cylinders and pistons, with two cast-iron sleeves placed between piston and cylinder. In each element the piston, inner sleeve, outer sleeve and cylinder are concentric, and each sleeve, both of which are driven from a halftime eccentric shaft, makes one upstroke and one downstroke during a complete cycle of engine operations. Each sleeve has two inlet slots and two exhaust slots cut in it, which register, at predetermined intervals, with each other and with ports in the cylinder walls, thus providing a passageway for the incoming or outgoing gases.

Considering, for purpose of illustration, the Stearns-Knight type of engine, which has 4 1-4 inches bore and 5 1-2 inches stroke, Fig. 7 shows the outer surface of the exhaust side of its sleeve. Intake and exhaust slots are disposed at diametri-

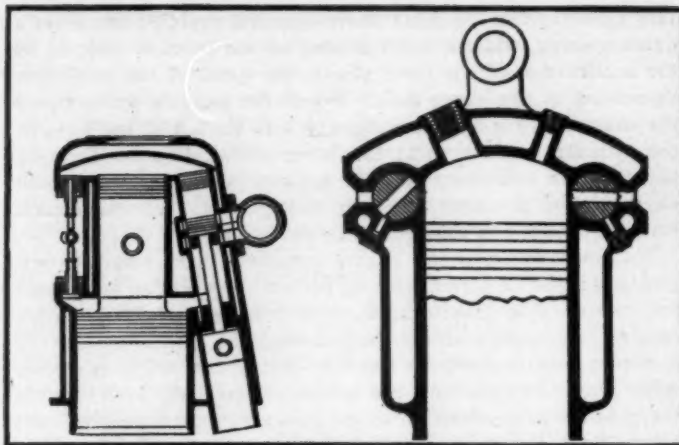


Fig. 3—Construction of Hewitt piston-valve motor. Fig. 4—Cross section of the Mead rotary-cylinder engine

cally opposite sides of each sleeve, the intake slots lying somewhat higher than the exhaust ports. The intake ports extend over 124 degrees of the sleeve circumference and are 1-2 inch high, giving a port area of approximately 2 1-4 square inches. The exhaust port, covering the same angular field, is 5-8 inch high to permit of a free passage of the hot gases; the area of the exhaust port is 1 4-5 square inches. Thus the cross-sectional area of the intake port is equal to that of a poppet-valve of 25-32 inch diameter, and that of the exhaust valve to a poppet valve of about 37-64 inch diameter. Moreover, it must be remembered that this area is utilized only at the time of maximum opening of the ports, but then there is a free gas passage, while a mushroom always presents an obstacle to the direct flow of charge or exhaust.

The Stearns-Knight sleeves, Fig. 7, travel through a distance of but 1 1-8 inches and therefore consume very little horsepower. The sleeves are reciprocated by small connecting rods attached to the throws of a halftime eccentric shaft driven by silent chain from the crankshaft. The timing of the valves is such that one sleeve travels 70 degrees in advance of the other, as a result of which arrangement the sleeves move in the same or opposite directions at various times of the cycle. Owing to the small throw of the sleeve rod eccentrics the speed of the sleeve travel is not the same at all parts of the sleeve stroke. For instance, before the intake ports in the walls are brought into communication with the combustion chamber, the inner sleeve rises

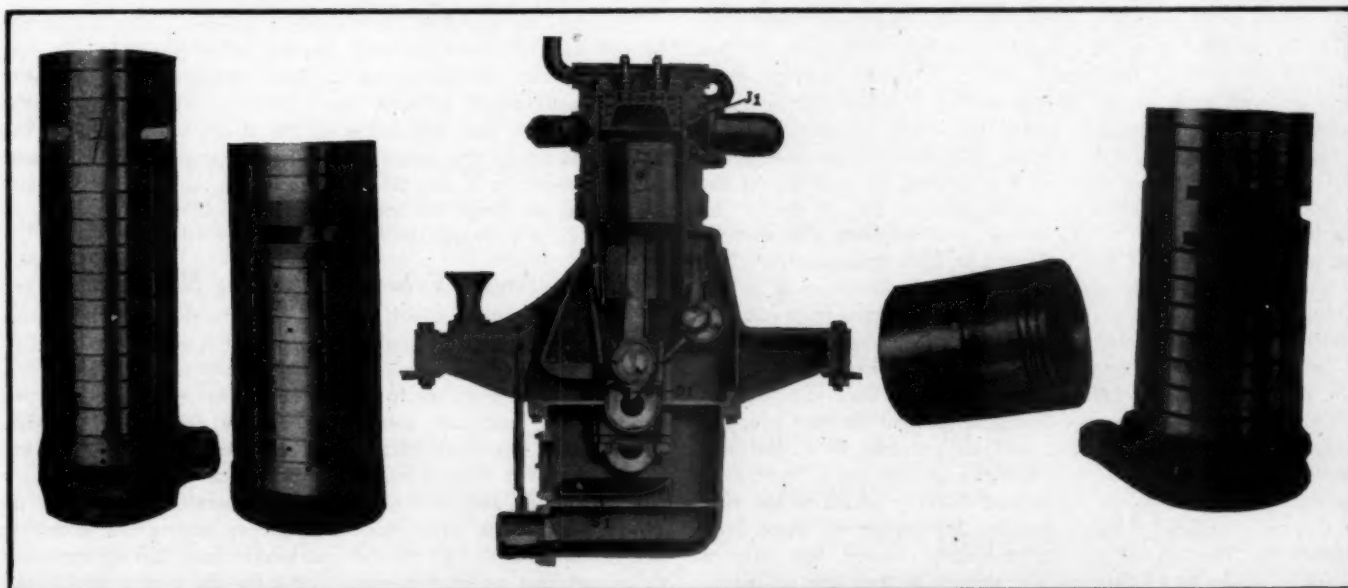


Fig. 5—Sleeves of the Stoddard-Dayton-Knight motor. Fig. 6—Sectional view illustrating the operation of the Columbia-Knight engine. Fig. 7—Piston and outer sleeve of the Stearns-Knight motor

very slowly, while the outer sleeve descends rapidly; this gives a quick opening, while a quick closing of the ports is effected by the acceleration of the inner sleeve, the speed of the outer one decreasing at the same time. When the exhaust valve opens the outer sleeve is almost stationary with its slot at the level of the cylinder exhaust port; the inner sleeve descends, causing the two slots to register with the exhaust port, after which both sleeves travel downward, thereby cutting off the communication between combustion chamber and exhaust port.

The construction of this engine comprised three very different problems: that of correct timing, perfect compression and ample lubrication. The definite timing now used was arrived at after considerable experimenting, and among the points worthy of comment must be cited the fact that during the explosion stroke, when the side-thrust of the piston is greatest, both sleeves travel in the same direction as the piston, reducing the frictional effect of this thrust to a minimum. To take in a sufficient measure of mixture the intake port is open during 220 degrees on the flywheel travel, being at its maximum during 15 degrees.

To secure the necessary gas-tightness of the cylinder chambers the clearances between sleeves, piston and cylinder respectively have been reduced to a minimum, the concave form of head shown in Fig. 6 of the Columbia-Knight motor having been resorted to. Tightness between the head and the sleeves is maintained by means a junk ring J, which takes up the sleeve wear by expanding. Besides the low clearance between the sleeves no precaution is used to maintain compression in this direction, in that the oil films between the several cylindrical walls have proved to be strong enough to withstand the difference in pressure during compression and suction strokes. The compression, according to the inventor, is about 75 pounds, while the maximum suction corresponds to a vacuum of 7 pounds on the cylinder.

#### Lubrication System of Sleeve Motor

The foregoing remarks show the importance of ample lubrication. It was their shortcomings in this respect that caused former experiments with sleeve-operated gas engines to fail, and the manner in which the problem is solved in the Knight motor evidences the vast amount of work expended in this direction. The sleeves are lubricated by splash, an oil mist being produced by the scoop D1 dipping into the trough T1, Fig. 6. This oil mist lubricates the connecting-rod bearings and other parts requiring oiling, and part of the oil is thrown up against the walls of the sleeves, where it is retained by the concentric grooves shown in Figs. 5 and 6. As the sleeves reciprocate, the oil is rubbed over their surfaces, thus providing proper lubrication, while at the same time the grooves are filled with what could be referred to as oil compression-rings. When the oil has reached the level of the intake slots it is raised through diagonal grooves, such as are shown in Fig. 5, whereby the upper parts of the sleeves are also given their share of oil.

Fig. 7 shows very clearly a series of concentric grooves above and below the exhaust slots of the sleeves, as well as on the exhaust side of the cylinder. These grooves fill up, during the continued performance of the motor, with graphite produced by the partial cracking of the lubricant at high temperature. The grooves were originally made by a diamond-pointed tool, as the Knight engineers, before an important test, desired to preclude a destruction of the smooth surface of the sleeves where it was to be exposed to the continued heat of the exhaust. After the test, during which the behavior of the motor had improved to some extent, the engine was disassembled and showed graphite accumulations in the grooves, and as graphite is a desirable lubricant it was decided to retain the groove as a feature of standard construction. A force-feed delivery of oil to the ring in the cylinder-head insures positive lubrication of these high locations. The Stoddard-Dayton-Knight motor has also a series of holes bored through the sleeves to help the oil distribution, and similar holes are seen in the Stearns piston, Fig. 7.

The Stoddard-Dayton-Knight motor is made with the same

bore and stroke as the Stearns engine, but it has six cylinders. It has the silent-chain drive in common with all Knight types. All the details given above hold true with few changes for this type, the same being the case with the Columbia-Knight motor, which has 4 7-8 inches bore and 5 1-8 inches stroke.

In addition to the three Knight types mentioned the Atlas Engine Works has taken an American Knight license. In Europe, the British Daimler, Mercedes, Minerva and Panhard are marketing automobiles equipped with Knight motors, while the Austro-Daimler company is preparing for its manufacture. Of late the Rover and Deasy cars are also being equipped with motors of this type.

The principal points of difference between Knight motors and poppet valve engines are therefore as follows:

The slots in two reciprocating sleeves register at predetermined points and intervals with ports in the cylinder walls, thereby providing passages for charge and exhaust instead of the opening effected in poppet-valve motors by lifting the mushroom off its seat.

The Knight system has the immediate effect of preserving at all speeds of operation the most advantageous timing relation between piston and valve movements, provided that this timing relation is laid down in the design of the motor and exists at normal speeds. It is generally conceded that poppet-valves close late when the motor runs at high speeds, due to the lag of the valve springs. In addition to this the noise of the valve returning to its seat and of the tappet roller striking the cam are done away with.

Of course, the mere use of sleeves instead of poppet-valves, and a chain instead of a gear drive, is no insurance of perfectly silent operation. There was a stage in the evolution of the Knight motor when it produced a steady, very noticeable whistle at the time when the exhaust was half open, but this fault was corrected by the present design of manifold and the timing now in use.

#### Single Rotating-Sleeve in C. L. C.

The C. L. C. motor has a single rotary cast-iron sleeve with a spiral oil groove cut around its wall, and near its top portion it is provided with a wide expansion ring pinned to the sleeve. A rectangular opening is cut in the sleeve and ring, and this opening registers with inlet and exhaust ports in the cylinder wall, which are about 90 degrees apart. Thereby the timing of inlet and exhaust in relation to each other is fixed, and proper flow of the gases through the ports is effected at fixed periods of the cycle. The sleeve is rotated by a helical gear at half speed from a shaft chain-driven at engine speed.

Tightness of the sleeve against the cylinder walls is insured by the wide compression ring, besides which there is one ring above the port and two below it. Lubrication is by splash from the connecting-rod troughs, the oil being lifted through the helical grooves, and the inside of the sleeve is supplied by the oil carried up by the piston. The driving chain runs in grease, being encased in a separate housing. As regards cooling and the taking of thrust the same principles hold as in the case of the well-known Argyll sleeve-valve motor.

#### Argyll Type Has Twisting Sleeve

The Argyll motor, which is identical with the French Picard-Pictet, makes use of a single sleeve, which is subject to a reciprocating motion both in a vertical and rotary sense. The sleeve, Fig. 9, has five slots cut in it, two being for admission and two for exhaust, and one serving alternately for either purpose. The cylinder has three inlet and as many exhaust ports. Owing to the use of a double movement the sleeve never comes to a dead standstill, and in the mechanisms operating it there is no dead center to be overcome. The sleeve makes one complete revolution to each two of the crankshaft, and, having returned to its original angular position, reverses its rotary movement. During the same period the sleeve rises and descends once through its full stroke.



The sleeve is driven by an actuating disk skew-driven at half crankshaft speed. A pin connects disk and sleeve and is set eccentrically, resulting in a throw of 1-2 inches. The disk runs at half engine speed, and the resultant sleeve movement in two engine revolutions is an ellipse. The sleeve rises during the compression stroke and compression occurs with the sleeve in top position, where the ports are protected against the violence of explosion by a broad ring similar to that carried in the cylinder head of the Knight motor. The sleeve descends and rotates far enough to open the several exhaust ports, and immediately after the last exhaust port has been closed the intake ports begin to open, while the sleeve continues its rotation and ascends in the cylinder.

The half-time shaft is driven by a silent chain from the crankshaft, and on it four skew gears are mounted, which engage like wheels carrying the sleeve-actuating disks. The gearshaft also carries a wheel for driving the oil pump. The circulation system has been constructed with a view toward eliminating oil leaks, and the cooling water enters the jacket and rises on the exhaust side.

The sleeve tends to rotate the piston by way of the rings, which tendency is counteracted by the hold of the crankpin on one end of the connecting-rod and by the hold of the rod on the wristpin. While the relative speed of one sleeve against the cylinder ports is not quite as much open to development as that of two sleeves against the cylinder ports, the design and distribution of the five sleeves balance this shortcoming.

The rotary effect of the sleeve calls for efficient lubrication, which has been provided for by a circulating splash system, the oil in the base chamber being cooled by flanges arranged around the lower surface of the crankcase.

#### Broc Reciprocates and Rotates

The Broc motor, Fig. 14, comprises a cylinder and working piston, the working piston being divided into an inlet and an exhaust chamber. The working piston is surrounded by an exterior part having a port P in its top and a sinuous groove in one-half its circumference, by means of which connection is made between the piston chambers and cylinder inlet and exhaust ports P<sub>1</sub> and P<sub>2</sub> at predetermined periods. The interior part, or piston proper, is given reciprocating motion only, while the outer part, traveling up and down with the inner one and carrying the piston rings, is also afforded a rotary movement at half engine speed by a 90-degree bevel gearing G from the crankshaft. One gear is integral with the crankshaft, while the pinion meshing with it is attached to a tube surrounding the connecting-rod C, which tube is caused by the gearing to make one revolution to every two of the crankshaft and to rotate the outer part of the piston assembly. The force of the combustion of the engine charge being transmitted through the crankshaft only, the tube T and bevel gears take no thrust and receive no strain whatever, according to the designer.

#### Mead Rotary Cylinder Valve Motor

By concentrating his efforts on valve operation the designer of the Mead engine succeeded in the construction of a product along otherwise well-established lines. The valves, Fig. 4, are cylindrical gray-iron castings with diametrical slots cut through them. The length of the valve cylinder—there is one for admission and one for exhaust—is the overall length of the motor, while the thickness, in the case of a 4 by 4 1-2-inch motor, is 1 3-8 inches. The slots are 3-8 inch wide, being as long as the cylinder bore.

To prevent warping of the valve under the hot working conditions, the gray iron is annealed before use. Equal cooling is effected by the distribution of the water-jacketing space around the valve circumference. Each valve is rotated at one-quarter crankshaft speed, as it acts with the slot, making connection either way between combustion chamber and gas lead. Timing is such that the intake opens from 5 to 10 degrees after the piston has passed the top dead center and closes at 29 or 30

degrees after the lower dead center. Exhaust opens from 60 to 68 degrees before the lower dead center and closes about 5 degrees after top dead center.

The valves are driven at half reduction by one worm located above and parallel with the crankshaft and at the upper end of a vertical half-time shaft, which also actuates the magneto. By forced-feed lubrication a thin film of oil is continually maintained around the valve, preventing it from sticking and cooling it to a certain extent.

#### D-Valve Cylinder of the Darracq

Following the general trend, the Darracq company came to the fore at the Olympia Show with a valveless creation. The cylinders of the engine, Fig. 10, exhibited had one port for both admission and scavenging of the gases and a D-valve to regulate their flow. The valves for the cylinders are obtained by the use of a hollow cylindrical tube, which has a segment cut away in alignment with each cylinder, the remaining portion of the cylinder being closed up by a singularly shaped wall surface, a cross-section of which may be seen in Fig. 10. The non-circular portion of the D-valve is shaped somewhat like the impelling blades on centrifugal pumps of the Rateau type, thus making for an easy flow of the gases between cylinder port and manifold ports. One feature of this motor which has aroused varying comment is the fact that the cylinder port has been set low enough to be covered and protected during the explosion stroke, and in this way obviates all thrust on the hollow valve. This advantage has been secured at the expense of admitting the charge after the piston is well on its way down, but the cylinder port has been made very large to overcome this defect. The lubrication problem has been worked out to a nicety by Henriod, the designer of the motor, by making the clearance between the valve-tube and its casting 1-20 millimeter, which is the maximum thickness, according to the designer, of an oil film binding two metal surfaces together. This oil film forms a continuous and strong joint between tube and housing.

#### Itala Rotary Cylinder Valve

The minimum of material used for valve operation seems to have been reached in the Itala engine, where one cylinder is so bored as to regulate admission and exhaust for a pair of cylinders. The plug has two passageways leading from central gas inlets to outlets on the periphery, one for the incoming gases and the other for exhaust gases. This principle is illustrated in Fig. 1, which also shows a series of openings above and below the peripheral rectangular openings. These grooves serve to form a series of gastight oil rings.

The valve plug is inclosed in an oil-tight, water-jacketed casing, which has an inlet for the force-feed oil lead supplying the lubricant to the valve. The jacket is of such dimensions that the cooling effect is ample and the exhaust has an opportunity of unimpeded escape to the muffler.

The valve plug is secured to the upper end of a vertical shaft, which is worm-driven at one-quarter crankshaft speed. A shaft which takes the place of the ordinary camshafts, and also drives the magneto and water pump, drives the valve shaft by helical gearing. The valve making but one revolution in four of the crankshaft, normal cooling and lubrication reduce the probability of the valve seizing to a very small one. As the plug is made of a solid piece, its masking by the piston has not been found necessary, which again permits of placing the cylinder ports as high as may be desirable. Another feature which is well brought out by the illustration is the accessibility of the valve, which in case of seizure or breakage may be quickly and easily loosened or replaced.

#### Elmore Double Rotary Distributer

The Elmore two-cycle engine contains a rotary cylinder through which the gas coming from the carbureter passes into the crankcase, where it is compressed, the compressed

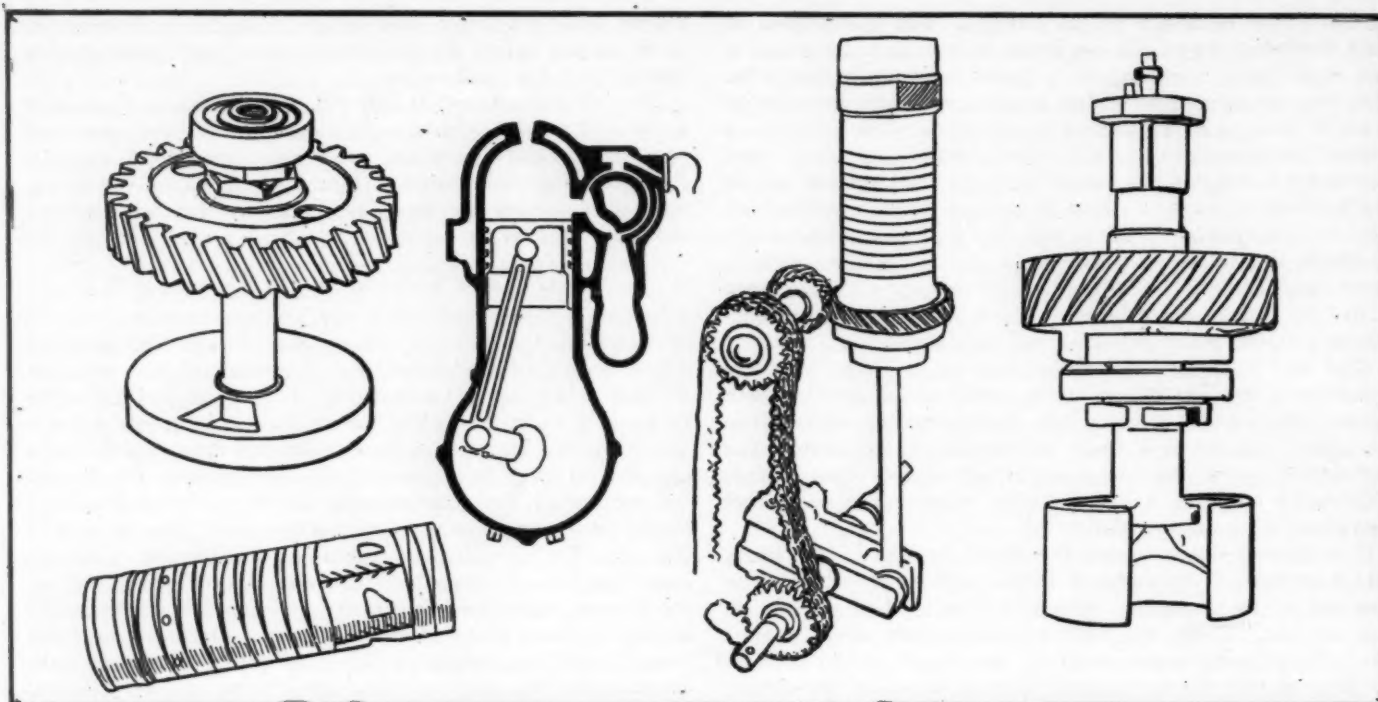


Fig. 8—Rotary disk of Reynolds motor. Fig. 9—Twisting sleeve valve of Argyll engine. Fig. 10—Cross section of Henriot-Darracq design. Fig. 11—Sleeve and drive of C. L. C. motor. Fig. 12—Cid rotary valve

charge passing through another port in the rotary cylinder into the combustion chamber. The distributor is a two-part central cylinder almost surrounded by another cylinder. There are four principal chambers, one for each cylinder and each divided at its exact center. The two parts of a distributor chamber are connected by a bypass opening and closing automatically with the throttle opening. With the action of a less than half-opened throttle the bypass remains closed, but when the throttle is opened half-way, connection is made between the halves of the distributor compartments. The gas coming from the carbureter first flows around the inner rotating cylinder into the compression chamber, and, when compressed, passes through the interior of the rotating cylinder to the combustion chamber. When the power-stroke is almost finished the dead gases are expelled in the regular two-cycle way, with the inrushing, compressed charge helping in the process of scavenging the waste gases.

#### Reno-Bois Split-Ring Valve

The split-ring type of valve is somewhat similar in effect to the single sleeve, it being a low sleeve split on one side and cast with two grooves on the other. The split ring is of gray cast iron and similar in principle to those used with pumps and compressors, but its construction is such as to insure gastightness without the use of a stuffing box. As Fig. 15 shows, the split ring is so located in the cylinder that its reciprocating motion covers and uncovers inlet and exhaust ports alternately, the ring being reciprocated by means of a bell crank lever and rocker arm, the latter bearing upon a cam. The cam is secured to the half-time shaft driven by the crankshaft, through a vertical shaft with worm gears at the lower and bevel gears at the upper end. The rocker arm is pressed down by a spring as shown in Fig. 15, so that it follows closely the contour of the cam, uncovering the exhaust port, when it is lifted to its highest position, and the admission port when in its lowest position. The vertical travel of the ring in the case of a motor of 3.9 inches bore and 5.5 inches stroke is less than 1 inch. The weight of the ring in this motor is 15 ounces. As reference to the illustration shows, the inlet port is arranged above the exhaust port, so that the ring is swept by the cool incoming gases, while the hot exhaust gases do not pass over it. Thus the ring is exposed only to the heat of explosion, and cooled by the water circulating through the cylinder jacket.

The lever of the bell crank extending through the split ring does not obstruct the incoming charge, according to the makers of this engine. It even increases the cooling of the lever and ring. On the other hand, the dome-shaped lever to which the split ring is held is struck by the full impact of the explosion, with a consequent tendency to move it in the same direction as the piston. This thrust is, of course, counterbalanced by the spring acting on the short lever arm, and by the cam taking the thrust finally. In this design adequate strength and perfect lubrication and cooling are among the prime necessities for perfect operation.

#### Cid Uses Rotary Disk Valve

The Cid valve, shown in Fig. 12, is a rotary disk driven by an overhead helical gear sweated on the same shaft as the valve disk. The valves rotate at half engine speed, being actuated by a horizontal overhead shaft carrying four helical gears each of which meshes with one of the gears on the valve stems. The valve spindle has two transverse arms, each with a groove; around the arms is fitted a vertical split sleeve, which has two tongues extending into the grooves. The valve stem is rotated at half engine speed, whereby intake and exhaust cylinder ports and the respective manifolds are made to register. The sleeve is designed to fit snugly into the cylinder head, being separated therefrom by a thin film of lubricant, and guarded against excessive expansion by a sufficient degree of cooling; but the valve may expand within a certain range owing to its being split on the periphery, thus making gastight joints. The diameter of the valve is equal to the bore, save for a difference permitting of fitting the valve into the cylinder. As the vertical wall of the valve bears against the top portion of the cylinder head it takes the thrust due to the explosion, without transmitting it to the driving gear train above. The overhead shaft runs at engine speed, reduction being made between it and the valve-spindle gears, and in order to have a well-balanced delivery of power from this shaft to the valves the alternating sleeves turn in opposite directions. A commendable feature of this design is the thorough and positive method of lubricating the sleeve by splash, as the piston on the up-stroke bears directly against it. The gears driving the valves may be readily exposed for inspection or repair by removing the timing-gear housing and magneto.



### Reynolds Rotating Disk Motor

The valves in the Reynold's motor are metal disks with their diameter equal to the cylinder bore and about 3-8 inch thick. The valve has a section cut out which is equal in size and shape to the cylinder ports, there being one for admission and one for exhaust. Above the valve disk and in alignment with the respective cylinder ports are inlet and exhaust passages, so that, if the cut-out section passes between the cylinder port and passage for either inlet or outlet, a free way is made for the gases.

Each valve is mounted directly above its engine cylinder and secured to a vertical shaft which carries a spiral gear at its upper end. This gear is a member of a gear train composed of four pinions of the same size and design and driven by a fifth pinion which rotates at half crankshaft speed; it is secured to a vertical shaft actuated by a worm gear on the crankshaft. Lubrication is insured partly through the cylinder splash, and partly by force-feed, oil being directed into the gear housing above the motor. There is no difficulty in cooling this type of motor so that the possibility of valve seizure is eliminated. There being but few moving parts contained in the mechanism, chances for trouble creeping in are small. The spiral gear idea has been carried through in the case of every detail, and noiseless performance goes hand in hand with such a design.

### Hewitt Piston Valve Motor

In this engine each working cylinder is cast integrally with two auxiliary cylinders, in which auxiliary pistons travel. Each piston valve, at a certain point of its stroke, uncovers a port corresponding with either an intake or exhaust port. As the auxiliary cylinders are inclined toward the working ones, there is an opportunity for efficient water cooling which has been taken advantage of. The crankshafts of working and auxiliary cylinders are drilled to permit the oil traveling to the various bearings, while the splash of oil from the crankcase contributes its regular share of lubrication.

While the auxiliary pistons do not always act in parallel with the working pistons, they serve, in a way, to equalize the varying turning moment created by the latter, so that a well-balanced operation results.

While a number of first-class manufacturers adopted the sleeve motor or are busy with the construction of other valveless types, another set of makers of equally high standing did not fail to take notice of the trend, and to adapt themselves to it in their own way. They, too, went after decreased noise and increased efficiency.

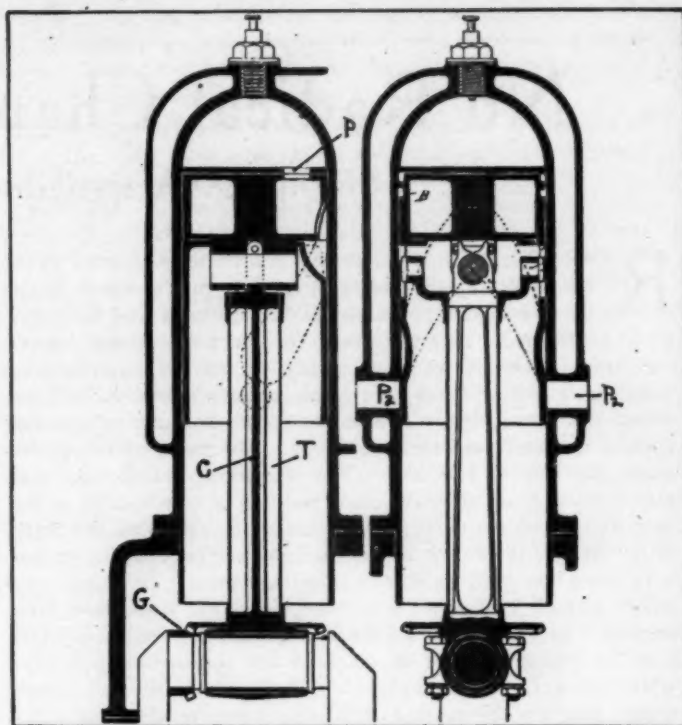


Fig. 14—Broc reciprocating and rotary sleeve motor

### Poppet-Valve Makers Active

Much work has of late been done in redesigning the shapes of cams so as to obtain a constant contact between them and the tappet rod rollers. The valve stems are, in many cases, inclosed in guides giving positive and true reciprocation and permitting of copious lubrication. Finally, the valves themselves have been designed to give smooth operation and by well-proportioned springs their dimensions have been so laid out as to give large passages for the incoming and outpassing gases.

To further reduce noise, the valves are so incased that no evidence of lost motion can find its way to the ears of the people in the car. Vibration is also lessened by this revision of design and positive directing of the moving parts. By means of all these refinements the ideal maximum of attainable power is more nearly approached.

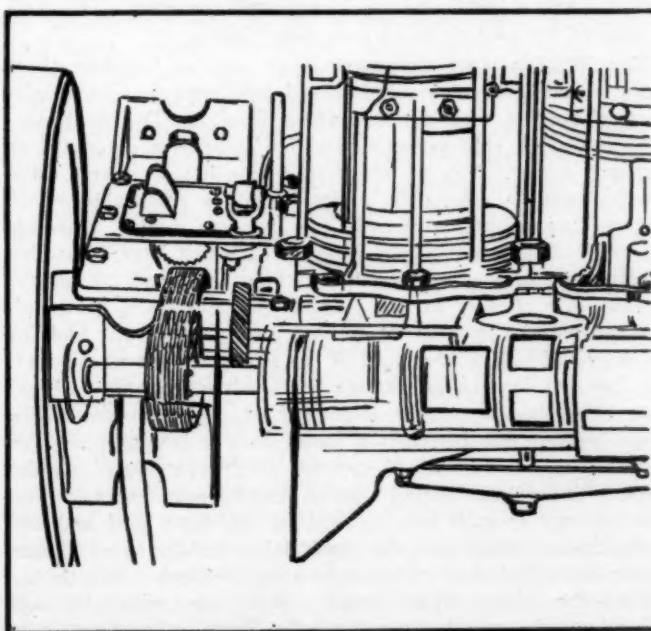


Fig. 13—Construction of Elmore distributor valve

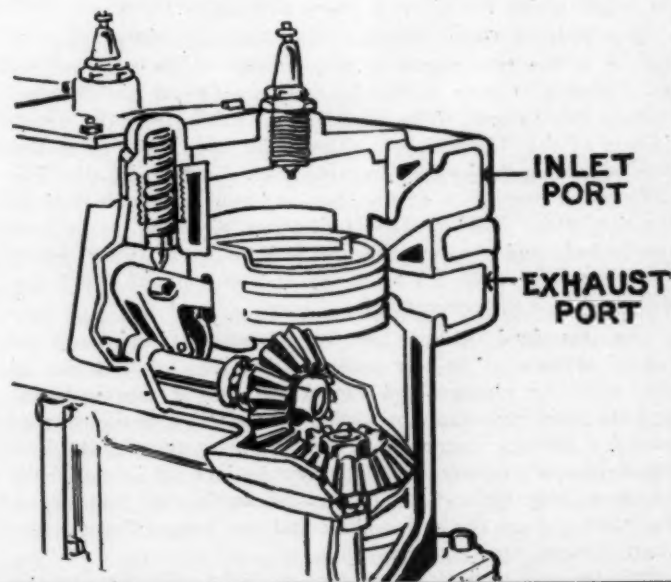


Fig. 15—Reno-Bols Sphinx split-ring valve motor

# No Radical Changes in Rear Axles

## Simplicity, Accessibility and Strength Featured

**R**EAR-AXLE construction has not changed to any great extent during the past year outside of the worm drive. The bevel differential is holding its own and bids fair to do so for some time to come. There are now many American firms, however, who are taking up the worm drive and bringing it forward, as European manufacturers have been doing for some time. The pressed-steel housing is proving popular and there are some additions to the ranks of those who make this type of rear axle. The accessibility of the axle has also been made an objective point and this is very notable in the ease with which the parts may be reached by removing the cover plate. Where the entire axle is made by one concern the brakes have been increased in size in many instances. In some cases where 14-inch brakes were formerly used the sizes have been increased to 17 inches. In the commercial line bolted-on hub caps are being installed in place of the screwed-on hub caps which were formerly employed. There are more unit power plants now on the market than was formerly the case. The number of cases in which the gearset and differential are combined under one housing is especially noticeable, as are also the number of trucks which are fitted with four-speed transmissions with direct drive on third. The high speed is geared 25 per cent. higher than direct drive and is for use in returning empty.

The Timken rear axles are of two types, 30-35 horsepower and 40-60 horsepower for pleasure vehicles. The most important change on these is the fact that the brakes have been enlarged from 12 inches in diameter to 14 inches in the smaller axle and from 14 to 17 inches in the larger axle. Special attention has been given to the commercial situation and several improvements have been instituted. Among the most important of these are the bolted-on hub caps in place of the screwed-on type formerly employed, the alloy steel used in the construction of the axle in place of the high-carbon steel which was formerly employed. The dead rear axles are now of oblong section instead of the square section used in former years and the concern now manufactures the complete driving mechanism, including rear axle, brakes, radius rods, a jackshaft, etc. The radius rod is worthy of special notice since it has five joints in its length giving flexibility in every direction.

The Warner Gear Company has been specially active in regard to the refinements in gear-cutting which will tend toward silence. Center control has also been given special attention by this concern. The material used this year in the manufacture of the differentials is either alloy, special car or carbon steel according to the duty imposed upon the differentials. The differentials are either of the spur or bevel type as desired by the purchaser. The commercial situation has by no means been overlooked, and the manufacturers have made many heavy truck gearsets which are combined in a unit housing with the differential on the countershaft.

The Standard Roller Bearing Company has made no radical changes in its rear axle for this year. A full line of rear axles for pleasure and commercial uses is manufactured, and the most important innovation is a spiral-gear-driven rear axle for delivery wagons of from 1,500 to 2,500 pounds. The other changes which may be noted are the increase in the length of the driving pinion-shaft of the differential, the removal of the bearing from the pinion shaft and the fixing of the drive-shaft integral with the driving dog.

The American Ball Bearing Company has brought out an entirely redesigned rear axle. The axle is of the floating type

and is made in four sizes. The axle and driveshafts are of heat-treated alloy steel. All gears are of hardened alloy steel and the teeth are planed. Single or double-row annular ball bearings are optional, or, if desired, straight or taper roller bearings may be substituted. External and internal brakes are fitted with drums of 12, 14 or 16 inches in diameter, according to the size. The driving member of the rear axle is a unit and may be adjusted while in place, thus rendering it very accessible in this respect. The axles are sold under the trade name of the American Axle.

The Sheldon Axle Company has brought out a new 3-ton commercial rear axle complete, that is, including radius rods, etc. The brake drums are 18 x 4 inches and the axle will handle anything up to 50 horsepower. The Cotta transmission is used in connection with this rear axle to make up the complete plant, while Sheldon ball bearings are used throughout. The brakes are on the rear axle and transmission in the 3-ton truck, while in the smaller axles made by this concern the brakes are on the rear axle. Two models of pleasure vehicle axle have been brought out, one for 25-35-horsepower cars and the other for those of 35-55 horsepower. The housings are of cast iron throughout and everything in the differential housing is removable from the rear by simply removing the cover plate from the differential. The large pleasure axle is of the floating type, while the other axle is of what may be called the three-quarter floating type, that is, it is of the semi-floating type with a long bearing at the end of the axleshaft which is so arranged that the live axle shaft may be removed.

The A. O. Smith Company has brought out a new rear axle known as the type N, which thoroughly represents modern practice in all particulars. The differential housing has been so arranged that when the cap is removed the differential housing carrying the bevel gear, pinion and bevel-gear differential may be removed through the opening. The driving pinion is carried by two ball bearings of similar type having balls of 3-4 and 5-8-inch diameter respectively. The brakes are double internal, asbestos lined, and can be adjusted for wear. This axle is adapted for cars up to 2,500 pounds capacity.

The Weston-Mott Company is at present building three types of axles representing the fixed hub, semi-floating, single-bearing floating and double-bearing floating. The malleable-iron-case axles, split vertically and horizontally, are adopted as standard design. The vertically split axle has no cover, while the horizontally split axle is fitted with a removable cover. Besides the types mentioned, this concern builds rear-axle housings of the pressed-steel type, all of which have removable covers opening at the rear. All internal parts are removable through the opening at the rear of the axle. On the semi-floating type the hubs are keyed and fitted to the outer ends of the mainshaft. The inner end of the shafts are not mounted on bearings, but float in the differential, which is mounted on bearings. This insures proper alignment of the bevel ring. The single-bearing floating type is made with a roller bearing or with a ball bearing placed directly under the spokes of the wheel. The double-bearing type of floating rear axle uses two ball bearings in each hub, a large one to carry load and end thrust and a small one for load only. Shafts are of high-carbon or nickel steel unless otherwise specified. Ball thrusts are of the Weston-Mott design, while the other bearings throughout the rear axles are of the Hyatt roller type or of New Departure ball make.



The Stutz Auto Parts Company makes a rear system in two types which are sold under the classifications A and B, the former for use in cars of from 20-25 horsepower and the other for use in cars from 30-40 horsepower. The gearset housing is an aluminum casting made integrally with the differential housing, the system being doubly-trussed and the casting ribbed to withstand severe shocks. Annular ball bearings are used throughout the gearset and differential. The axle is of the semi-floating type. The propeller shaft runs on roller bearings and the length of the tube is optional with the purchaser. The countershaft is of special steel equipped with double nickel-steel Woodruff keys throughout. The brakes used are of the double-expanding type lined with asbestos, the brake drums being 14 inches in diameter and 4 1-2 inches wide.

The Hess Spring and Axle Company has not made any noticeable changes in the axle which they are at present putting on the market. The housing is of pressed steel and the axle is equipped with New Departure ball bearings throughout.

There are two ball bearings on the pinionshaft and two on the hub, the axle being of the floating type. In a short time a series of commercial axles will be put on the market by this concern. They are now under construction.

The McCue Company, Buffalo, N. Y., makes six models of rear axles. The axle housings of all the models are of sheet steel in one piece, without tubes and telescoped into the ends for spindles. Annular ball bearings are used throughout these axles and are of ample size to carry all the weight it is possible to impose upon them without undue strain. The pinionshaft and gear are of 3 1-2 per cent. nickel steel, while the driving gear is of carbon steel. The floating axleshafts are drop forgings with integral head machined to finish. The shafts are all interchangeable. Two of the models, namely, 2X and 4X, are made for high-class cars requiring light but rigid construction. The axle housings in these two models are of one-piece steel tapering from 3-16 inch at the center to 5-16 at the ends. The end bearings of this axle are No. 311 annular ball bearings.

## Makers of Automobile Forgings and Castings

**A**ERICAN BRONZE COMPANY, Berwyn, Pa., is putting out a dense bronze bearing metal under the trade-name of Non-Gran. It is not a babbitt, but a dense bronze capable of withstanding the stresses imposed by high-speed, heavy-duty bearings.

The Carnegie Steel Company, Pittsburg, Pa.—This company's line is too well known to need specific description. Steel of any composition, hardness, softness or tensile strength for all purposes is manufactured.

The Crucible Steel Company of America, Pittsburg, Pa., manufactures all kinds of steel for any purpose for which steel may be used. Spring steel is a specialty with this concern and it produces any type of pleasure car or truck springs.

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., has a department in which Parson's white brass and Cramp's special bearing bronze are made. Cored bars of all sizes are kept in stock and solid bars up to 2 inches diameter and 12 inches in length.

The G. Derihon Forge Works are manufacturing a complete line of drop forgings for automobiles. Steel of any required tensile strength and elastic limit is furnished in the drop forgings, while alloy steel is also used when required for such work as transmission parts, etc.

Defreville & Masset, Newark, N. J., are making a complete line of French phosphor-bronze bushings, rods and special castings. The wearing qualities of these bronzes have been given special attention; they are for use in bearings of all sizes.

The Doehler Die Casting Company, Brooklyn, N. Y., makes all kinds of intricate and simple die castings for automobile work. By the die-casting process many parts which were formerly considered very costly to manufacture can now be turned out at a much increased speed and at the same time are cheaper to manufacture on account of their ability to be cast in one piece.

The Driggs Seabury Ordnance Corporation, Sharon, Pa., is specializing in drop forgings for automobiles. Crankshafts, axles and all other parts which may be well constructed by the method of drop forging are handled by this concern.

H. H. Franklin Manufacturing Company, Syracuse, N. Y., specializes in die-cast finished parts. Gears, bearing caps and the innumerable small parts which are now made by the die-casting process are made by this concern to suit the requirements of the purchaser. The metal used is optional.

Isaac G. Johnson & Company, New York City, make steel for automobile parts. They will make any of the metal parts for any detail of the automobile, whether the same be cast, forged or pressed.

The Light Manufacturing and Foundry Company, Pottstown, Pa., makes the automobile brand of castings from aluminum, manganese, phosphor and plastic bronze. Die-cast metals are also a specialty and find their great use in bearings.

The Manufacturers' Foundry Company, Waterbury, Conn., specializes in cylinder castings. Besides the cylinders this concern with cast pistons, manifolds, ring pots, flywheels and all other castings throughout the automobile.

George Nash Company, New York City, carries a complete line of all kinds of steel and iron, as well as seamless tubing. Any steel or iron product may be secured from this concern, which specializes in high-grade steel strips, wire and specialties.

Thomas Prosser & Son, New York City, carry in stock a full assortment of Krupp steel adapted for gears, crankshafts and other automobile parts. The elastic limit of this steel is 100,000 pounds per square inch; tensile strength 115,000 pounds per square inch, with 18 per cent. elongation.

The Treadwell Engineering Company, Easton, Pa., makes electric steel castings. Any specifications of the material from which the steel is to be made is covered by this concern, which handles all the different vanadium, titanium, chromium and nickel alloys.

The Vanadium Metals Company, Pittsburg, Pa., is making the Victor Vanadium Non-Corrosive Silver Metal for use in such places as hub caps, throttle and spark levers, brackets and all other parts where brightness of polish is required. Its polish never dulls and it is stronger than steel.

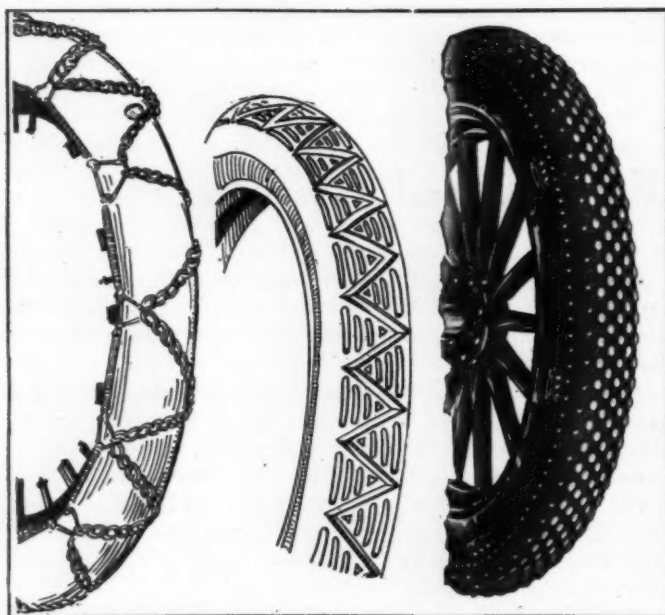
The Western Tool and Forge Company, Brackenridge, Pa., produces a complete line of drop forgings from any grade of steel required. Crankshafts, connecting-rods and axles are specialties. This concern is also fully equipped to carry on heat-treating, casehardening, bending, rolling or any other foundry or machine-shop work.

The Wetherill Finished Casting Company, Philadelphia, Pa., uses metal molds in making its castings and thereby increases the tensile strength of some of the parts. This is especially true of aluminum and its alloys and anti-friction metals and bronzes. The life of the bearing is therefore increased to a large degree.

# Tires and Tire Accessories Numerous

## Recent Shows Introduced Many Useful Novelties

**D**ETAILED REVIEW of the products of the more prominent tires manufactured in this country appeared in THE AUTOMOBILE of January 11, in connection with an article on the proper care and use of tires. The field being too wide to be covered in a single article, it remains to make a final résumé of those tires which could not be dealt with in the primary story.



Modern Appliance  
Co.'s Tire Chain

Lee Zig-Zag  
Anti-Skid

Woodworth  
Tread

The following series of short descriptions treats of these products, covering, at the same time, the wide field of tire accessories comprising tire pumps, anti-skid devices, tire repair outfits, and whatever refinements in the department of tire sundries the 1912 market affords.

### Tires and Casings

**Batavia Rubber Company, Batavia, N. Y.**—This company manufactures quick detachable and clincher tires in all sizes. The feature of the line is the Security tread which renders chains unnecessary as the configuration of the surface makes skidding impossible.

**Endurance Tire & Rubber Company**—The leading product of this company is a red inner tube guaranteed against deterioration and imperfection.

**Empire Tire Company**—Beside its regular line this concern shows a tire preserver or reliner in the form of an endless band that fits between the casing and the inner tube. It is made of the same materials as the tire itself and the company recommends it as an aid to increased mileage.

**Federal Rubber Manufacturing Company, Milwaukee, Wis.**—Four types of tire are made by this company, the clincher, quick-detachable clincher, straight-wall detachable and Rugged tread non-skid. The feature of the line is the smooth wrapped tread tire which is vulcanized in open stream, insuring uniform cure of material and perfect adhesion of tread to carcass.

**Hardman Tire & Rubber Company, New York City**—The leading feature of this line of tires is that they are made by the single-cure wrapped process. Another feature of the line is the Sure Grip non-skid tire. Round-tread casings and red inner tubes are also manufactured.

**Kelly-Springfield Tire Company, Akron, O.**—This company manufactures a full line of tires of all sorts, including the regular clincher, quick detachable clincher and non-skid types. The main features of the company's product are its elasticity and durability. Inner tubes are made in all sizes.

**Leather Tire Goods Company, Niagara Falls, N. Y.**—The Woodworth tread is an automobile tire cover used over the tire to protect it from wear, from punctures or other injuries and to prevent skidding. It is composed of layers of chrome leather, studded with steel rivets, and is held on the tire by circular rings on each side made up of strong coil springs.

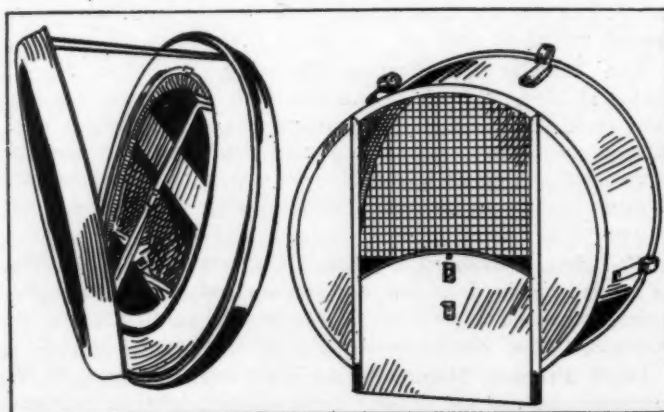
**Lee Tire & Rubber Company**—The Zig-Zag anti-skid tread stands out in this exhibit. Extending all around the circumference of the tire is a continuous ridge molded in zig-zag form and between the angles thus formed are ranged four graduated longitudinal studs.

**New Jersey Car Spring & Rubber Company, Jersey City, N. J.**—The casing manufactured by this company are made by the one-cure wrapped tread process in which the casing is built as a unit and cured as such in one operation, insuring uniformity of vulcanization and adhesion. The company also makes the Red inner tube.

**Portage Rubber Company**—This Akron concern is showing for the first time its new line of tires. The plain or wrapped treads shown are similar to the standard makes, but the feature of the line is the Daisy non-skid. This tread is formed of four rows of studs in the form of a daisy.

**Prince Tire Company**—A reinforced inner rubber cushion, vulcanized to the fabric of the tire itself and guaranteed by the company to prevent blow-outs, is the feature of this display. This layer of rubber composition is designed to protect the inner ply of fabric and thus to intrench the other layers.

**Russian Tyre Company, New York City**—This company is the importer and agent in this country of the Prowodnik tire which is made in Riga, Russia. Flat and round, rubber and steel-stud anti-skid types compose the line.



Merchant & Evans  
Tire Case

Ajax Sliding-door  
Tire Trunk



**R. & S. Tire Company, Detroit, Mich.**—The tire manufactured by this concern is of the solid sectional type and is designed for use with the R. & S. flexible rim which gives the resiliency necessary to absorb shocks. Of course, with the solid tire, punctures, blowouts and rim-cuts are impossible.

**Seamless Rubber Company**—A single-cured casing made in all standard sizes is the feature of this exhibit. The difference between the product of this company and the ordinary type of tire lies in the fact that only one vulcanizing operation is used in curing the tire. Full guarantees cover the product. The display is filled out with a full line of Kantleek inner tubes. The shoes are made in wrapped tread and non-skids. A full line of inner tubes is manufactured.

## Wheels and Rims

**The Anglada Company, Detroit, Mich.**—The Anglada demountable rim does away with all nuts, clamps, washers and loose parts, thus eliminating a considerable weight. The rim has a series of clips integral with it and the band on the wheel is fitted with integral lugs with which these clips engage and lock when the eccentric is turned. To remove the rim it is only necessary to loosen the locknut on the eccentric stem and disengage the clips from the lugs by turning the eccentric in the opposite direction.

**Detroit Demountable Rim Company, Detroit, Mich.**—A simple but strong bolt and draw wedge with a bronze nut is used with this rim. The section of the rim is cut out and fitted with ground joints, the loose section being held in place by a lock which makes a practically watertight joint. Provision has been made for preventing the rusting of any of the parts. When the loose section of the rim is removed the rim is of much smaller dimensions than the tire, facilitating its removal and application.

**Phineas Jones & Company, Newark, N. J.**—This company furnishes and applies any style demountable or detachable rim to the wheels it manufactures. The manufacture of experimental wheels is a specialty as is also the repairing and truing of old wheels.

## Vulcanizers

**W. J. Donnelly**—The National Motor Supply Company vulcanizer is an important part of the Donnelly display. This vulcanizer is made of cast steel and malleable iron and is heated by gas or gasoline. The tube plate is 7 by 16 inches and three tubes may be worked on at once if required. The casing mold is curved both ways to widen its field of usefulness. It is strictly a device for garages. A line of portable steam vulcanizers is also shown.

**James L. Gibney & Brother**—A tandem vulcanizer, capable of working on six tires at once, is the feature of this exhibit. The device is substantial and businesslike in appearance and is

nickel-plated throughout. The principle involved is identical with that used in the Eleck-trick line of vulcanizers last year, the difference being in size.

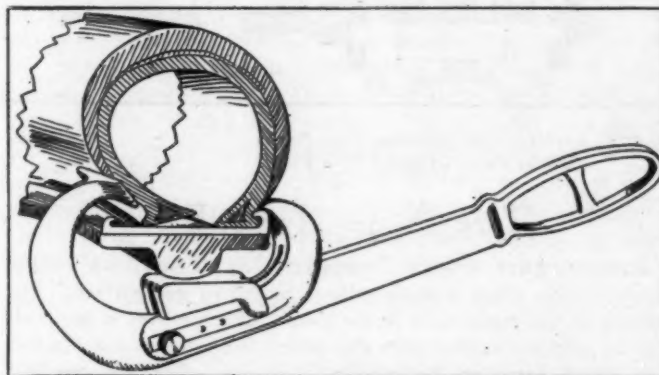
**Gray Specialty Company**—A handy vulcanizing outfit is the center of attention in this display, although a wide field is covered in more or less allied lines. The outfit contains dissolved rubber cement, vulcanizing solution patches of various sizes and other things. It is intended for the use of owners. Emphasis is laid on the cementless patch which can be applied by pulling away a cloth covering, moistening with gasoline and pressing into position. The frictional heat developed between the tubes is used for the vulcanizing process.

**Charles E. Miller**—This company is showing even more than its usual line of general sundries of all kinds and descriptions. One of the features handled is the Vulcan vulcanizer, a



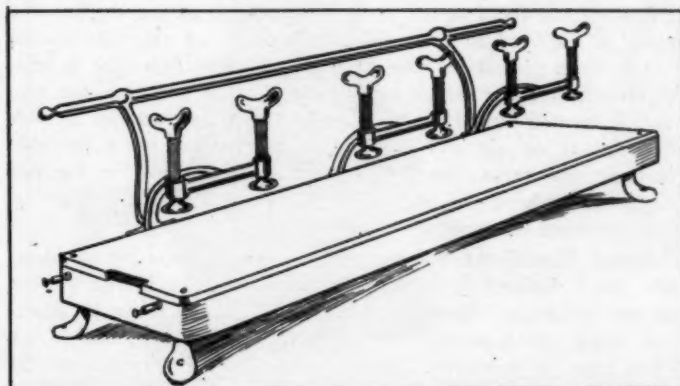
Standard Tire Protector

Never-Creep Tire Sleeve

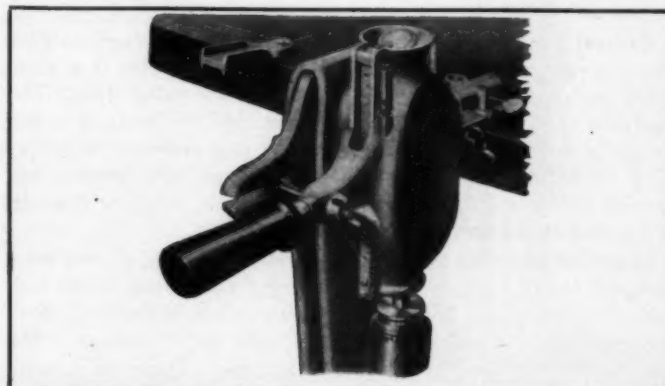


Stevens Q. D. Tire Iron

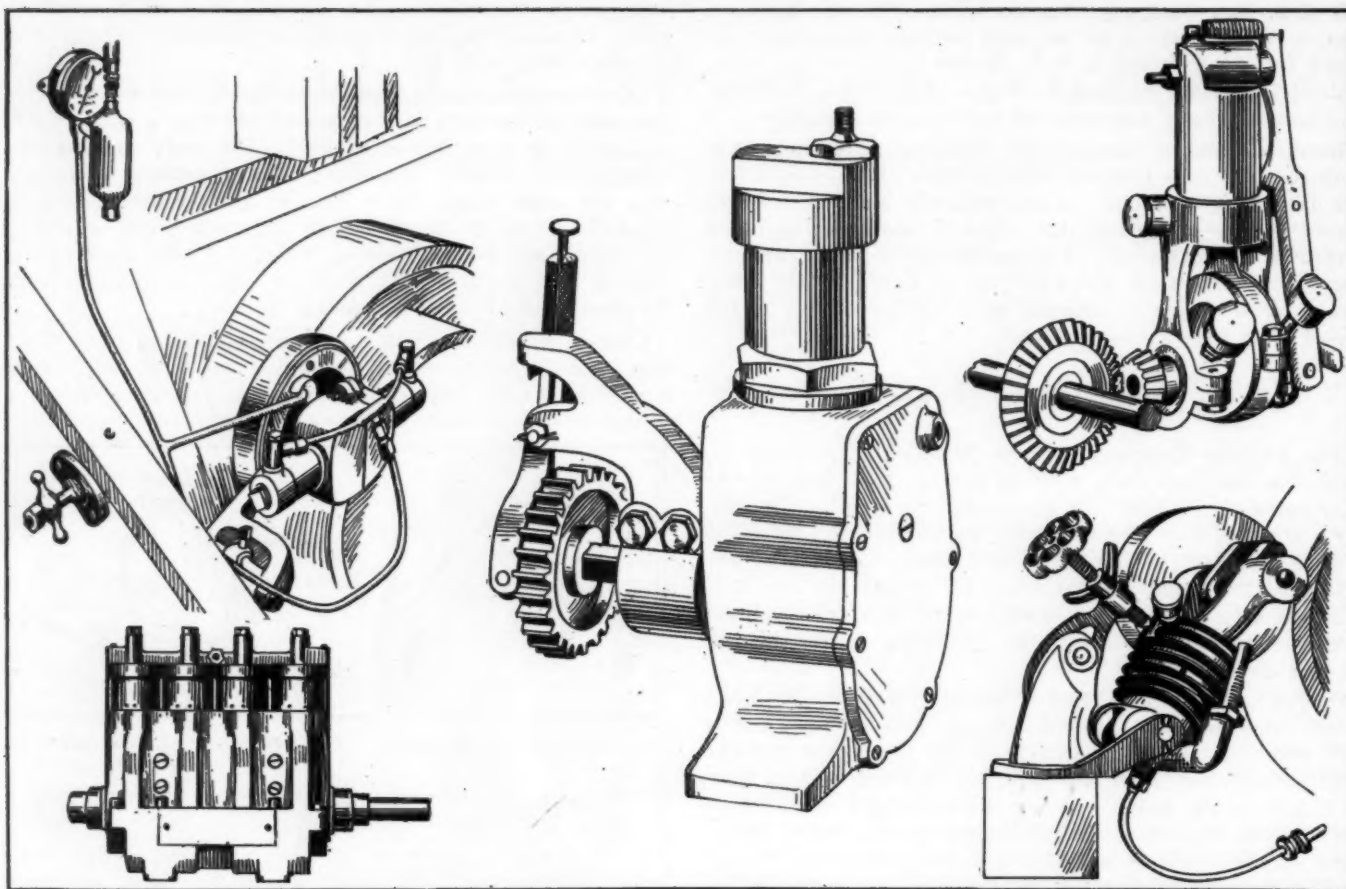
portable tire repair device. The feature of this vulcanizer is that it avoids the burning of tires and tubes under the operation of the inexperienced. This is accomplished by conveying moisture to the material under vulcanization by means of steam. This concern also makes a specialty of a vulcanizer substitute consisting of a cement and acid cure. This is packed in convenient packages and included in the tire repair kit put out by the company.



The Gibney Tandem Vulcanizer



The Shaler Vulcanizer



Bastian Two-Cylinder Tire Pump  
Kellogg Four-Cylinder Tire Pump

H. M. S. Automatic  
Tire Pump

Ten Eyck Tire Pump  
Tryon Tire Pump

## Tire Pumps, Jacks, Etc.

**Auburn Auto Pump Company**—The Ten Eyck pump shown in this space is made either friction or gear-driven. The feature of the mechanism is the clutch, which makes it unnecessary to stop the engine once the pumping operation has started. The clutch provides for automatic release when the required amount of pressure has been achieved in the tire. The Auburn company also shows the Ten Eyck jack, a pneumatic device operated by the Ten Eyck or any other type of pump. A control valve is closed or opened to raise or lower the car for repairing or storing purposes.

**Brown Company**—A special breather valve designed to insure nothing but air in the current supplied to the tires and applicable to any kind of an automobile engine of the four-cycle type is one of the features of the Brown Impulse pump. In operating, any spark plug may be removed and the pump is then screwed into the exposed tapping by hand. The engine should be run at low speed.

**Central Brass and Fixture Company**—The Springfield Tire pump is one of the lines shown in this display. This is a hand pump designed to screw on the outside of the valve stem. The barrel is of drawn brass, 27 inches long, and the pump is tested to 200 pounds pressure. This company also shows a wide variety of jacks, tire tools and holders, boxes and carriers, but nothing radically different from former years. A spring repairer is included in the line.

**Hartford Machine Screw Company**—A crucible steel pump, designed for tire inflation, and weighing 6 1-2 pounds, is the feature of this display. It is equipped with valves in the head, closing on a raised metal seat and held tight under pressure. No packing is used. It is adjustable to any car. The gear is ordinarily one and one with the engine and the normal speed is 550 revolutions a minute.

The Hawthorne Manufacturing Company, Bridgeport, Conn., is now making a four-cylinder power pump modeled after its well-known hand pump. The pump has four cylinders which are cast en bloc and the drive is arranged in the same manner as the hand pump made by this concern, which is illustrated on page 319. This pump is attached to the frame of the car and is driven off the motor crankshaft.

**Kellogg Manufacturing Company**—The four-cylinder air pump made by this concern is driven from any exposed shaft on the car to which a split gear can be attached. Friction drive is not recommended for this pump. It runs best at a speed of 550 revolutions a minute and is tested to deliver 200 pounds of air. The case is of aluminum and the top of brass; lubrication is by splash. Pressure indicators to correspond with the pump are shown. The pumps are made in a number of types to meet different requirements.

**Motor Car Equipment Company**—The Bastian tire pump in four styles is shown in this exhibit. These pumps are run by friction from the flywheel or can be geared to the shaft. The pump is adjusted in place by thumb screw on the side of the car or on a permanent base as required. The first type is belt-driven from countershaft and is suitable for garages; the second is gear-driven from the shaft; the third includes a tank for storage of air and the fourth is mounted on a portable carriage for garage use. The small sizes for use on the car itself are made in either one or two cylinder styles, and are of very compact construction.

**Noera Manufacturing Company**—Hand pumps for automobile tire inflation are depicted in many varieties in the display of this exhibitor. Single and compound pumps made of seamless brass are featured. The newest thing in the line is the Ideal type of compound pump, which has an arrangement of valves to provide a circulation of air from the intake to the tire inlet.



**Oliver Manufacturing Company, Chicago, Ill.**—This company has on the market two types of jacks under the names of the Peerless and the Oliver. The former is furnished either with or without a tire-removing attachment. The latter is the newer form, being similar to the earlier type, but heavier. The base is more substantial and the leverage has been increased. The tire-removing attachment is used in connection with the jack and handle, being hooked on the jack and placed between the spokes of the wheel to push the tire off. The Oliver jack, which is of malleable iron construction, is put together with three rivets. On the lifting bracket a leather pad prevents the marring of the part against which it is placed. This type is made for cars up to 3 tons, and it has an adjustment of from 10 1-2 to 20 inches.

**Tryon Auto Pump Company**—This tire pump weighs 9 pounds and is attachable to any car. It drives by friction from the flywheel and locks in position with a thumb screw. A reinforcing arm, fitted with bolt and nut, completes the fastening. The pump is air-cooled and lubricated just above the intake by grease-cup. A feature of this device is the fact that when the pressure in the tire has been raised to the desired point, the valve opens automatically.

**Werner-Service Manufacturing Company, Jersey City**—A unique device for pumping tires and lifting the car has been placed before the public by this firm. It is known as the Jack-pump and is a combination two-cylinder air-pump and jack. On either side of the base of the latter a cylinder of the pump is mounted, the whole outfit presenting a V-shaped construction with the shaft of the jack mounted vertically in the middle. The ends of the cylinder piston-rods are connected to a rocker arm, which is pivoted in the center to a vertical member. A slot is made in the center of this arm into which a long rod is fitted. The pulling of this rod back and forth oscillates the rocker arm, alternately rising and lowering the pistons in the cylinders, thus forcing air into the tires.

### Tire Protectors

**Continental Rubber Works**—Material for the repair of tires is an important part of this concern's display. Some of

the features are the inner liners and blow-out patches shown. These include the full standard line made of tire fabric and composition and shaped in a variety of ways. A specialty is made of inner tube patches and unvulcanized plasters which are cured after application by the heat generated in friction between the tubes.

**Double Fabric Tire Company.**—This concern is featuring its innerlock, double-flap line that is similar to its product of 1911. Tube patches that are affixed from the inside and vulcanized by the heat of the tire are shown in connection with the older items of this line.

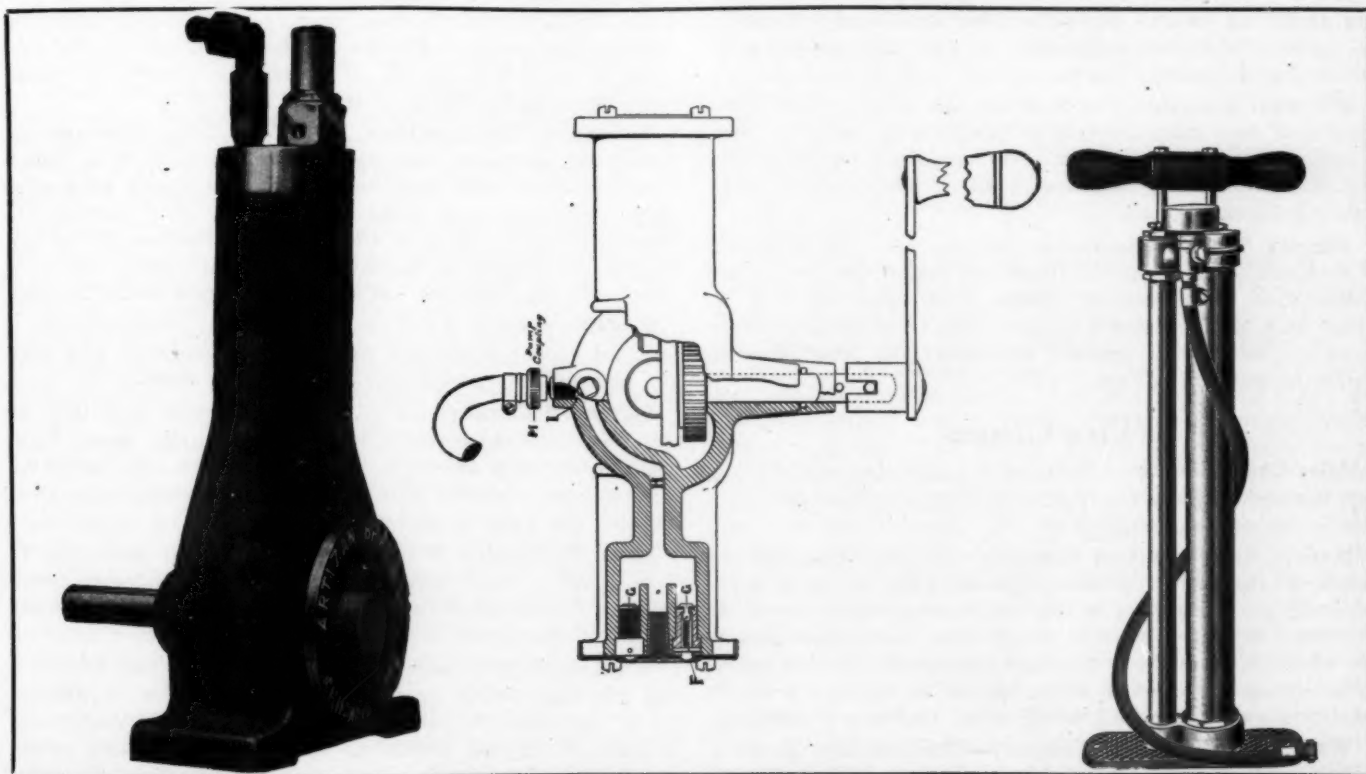
**John L. G. Dykes Company.**—Reliners in two styles are shown by this exhibitor. These goods are made of 16-ounce duck friction with rubber compound and thoroughly vulcanized. Like all reliners, the Dykes fit between the casing and tube. Repair gums for various kinds of vulcanizing and a full line of tire repair patches and boots are shown.

**Essex Rubber Company**—Unvulcanized shoe liners made in various sizes are the feature of this display. They are made of cotton fabric, frictioned with rubber composition and cemented on the case face. Curing is accomplished by the heat generated within the tire in operation. The company also shows a variety of repair goods, innerliners, tire sleeves and blow-out patches designed for inside and outside use.

**Hall-Thompson Company**—Flexible tube patches made of rubber and a full line of cementless repair patches are emphasized in this space. Both varieties follow standard practice. A



The Gemco Jack



A. B. C. Tire Pump

Hawthorne Tire Pump

Atlas Tire Pump

repair kit containing vulcanizing fluid and other needful elements is also shown.

**National Rubber Company**—Tirenew, a white or gray solution of rubber compound designed to preserve automobile tires, is offered by this company. It serves both as a pigment and as a waterproof covering for the tires.

**Pennsylvania Rubber Company**—The Bull-Dog cementless patch for inner tubes, which is applied by tearing off a facing of cloth and pressing upon the puncture where it is cured by the heat of friction, is shown in connection with the display of this company's standard tire line.

**Standard Tire Protector Company**—This concern shows a variation in its line from last year in that it has included a non-skid tread protector. A guarantee of 3,500 miles is made by the company. As formerly, the protector is placed completely around the tread of the tire.

**United States Tire Company**—In addition to its line of the standard tires this company shows a full display of tire sundries. An elaborate sleeve patch, made of from five to eight plies of fabric, with a fabric flap on either side to fit under the bead of the casing, is a feature. It is intended primarily for temporary repair.

## Tire Covers

**Ajax Trunk and Sample Case Company**—Tire boxes or trunks are the features of this line. One of the most popular patterns is made with a wooden body, steel bound and clamped and opening on a hinge in the middle of one side. Other types have sliding doors, both laterally and circumferentially, which give an air-tight joint. A variety of sizes and cover materials are used.

**J. Alexander Manufacturing Company**—Adjustable tire holders and brackets constitute the central attraction of this exhibit. One type of adjustable holder consisting of three pieces to be fastened on running board and dash of small cars with fore-dore bodies is particularly neat.

**Gilbert Manufacturing Company**—The Gilbert tire case of enamel duck and other materials is designed to care for a single casing and may be carried in brackets or elsewhere at the pleasure of the car owner. The Gilbert line also includes a variety of brackets, double and single, some of which are designed to be fastened to the running boards.

**Merchant & Evans**—The Star tire case made by this company is of sheet metal and may be finished in any style to correspond with the rest of the car. The case holds two shoes and has space for several tubes and a kit of tire tools. It opens easily and locks securely.

**Niagara Tire Company**—An entirely new line of covers is presented by this concern. These are neatly made covers for single shoes. The material ranges from enameled duck to Niagrasote, a heavy fabric leather. The cover buttons snugly along the tread. The company also shows two other types of covers of standard patterns.

## Tire Chains

**Atlas Chain Company**—Save for the widening of the tread link to prevent its catching in slots of street car tracks, the Atlas line is the same as last year.

**Modern Auto Appliance Company**—In connection with its display of the Little Steersman, a helical spring to correct automatically any mistake or mishap in steering, this company is showing a tire chain which is caught from side to side around the wheel. This results in the chain crossing the tread at angles of 45 degrees. It is caught at the bead of the tire by a series of small hooks equipped with levers by which slack may be taken up.

**Weed Chain Tire Grip Company**—This company shows a full line of merchandise in which no material changes have been made during the past year.

## Miscellaneous Tire Specialties

**N. B. Arnold, Brooklyn, N. Y.**—The Slikup line of specialties includes Slikup, a liquid composition for beautifying and preserving rubber, Slikup engine enamel, Slikup aluminum paint, auto soap, body polish, metal polish, varnish, metal finish, enamel top dressing and mohair top cleaner.

**C. & T. Auto Specialty Company, New York City**—The line of this company includes the Universal blowout patch, designed to insert on the inner side of a shoe to permanently repair a blowout or cut, a tire preserver which fills the pores of rubber when it begins to deteriorate, the Ever-Ready patch and the C. & T. concentrated rubber cement for quick repairs.

**Garage Equipment Company**—Tire holders, tools, mud hooks and jacks are a few of the interesting things on display in this section. The Gemco jacks are primarily designed to hold the car above the floor of the garage. They are cheaply and strongly made and the top is finished with a leather cushion to avoid marring the paint on hub or axle. When it is desired to raise the car the jacks are placed in position and a push on the lever is sufficient to elevate the hub or axle several inches.

**Hartford Suspension Company**—The Hartford Auto-Jack, the lever of which is long and the stroke of which is short, is the focal center of this exhibit. The gear arrangement is so fixed that with the long lever little power is required to lift a heavy car. A reversing lever is called into play when it is desired to lower the car.

**G. & S. Accessory Company, New York City**—The features of the G. & S. tire holder are that it is all on the running-board, is adjustable to any size tire, with or without demountable rims, and to any make or type of car and that tires cannot chafe on the emergency brake-lever.

**The Janney-Steinmetz Company** shows the Invincible tire gauge, made by the United States Gauge Company, which is constructed on the principle of the steam gauge, the air flowing out of the tire impinging on a surface, whereby a lever is caused to move the hand on the dial. A retaining mechanism holds the hand in position there until it is released by pressing a button on the side of the instrument.

**The Mutual Auto Accessories Company, New York City**—Vulco, manufactured by this company, is a rubber substance which, when applied, vulcanizes and becomes a part of the material to which it is applied. It is particularly useful for small holes exposing the fabric of the tire.

**Newmastic Tire Company, New York City**—Newmastic is a patented compound manufactured in the form of a liquid which within a very short time becomes an elastic solid substance and remains so under all conditions. It is used to fill tires in the same manner in which they are filled with air. When the proper pressure is reached the valves are closed and in a few hours the filling has set and the tires are ready for use.

**P. Reilly & Son**—A full line of patent and enameled leather used for various purposes is shown by this company. Tire covers, tops, upholstery and other accessories are made.

**Stevens & Company**—The Quick Detachable Tire Iron of this concern is the newest thing displayed in this space. It is useful where tires have crystallized to the rims. It consists of a jawed lever supported on a key so that a pressure of the hand applies great force to the tire-bead.

**Chas. O. Tingley & Company, Rahway, N. J.**—C. O. T. Tire Solder is a self-vulcanizing compound which, when hard, becomes a hard but elastic rubber possessing some of the properties and appearance of both inner tube and casing.

**Voorhees Rubber Manufacturing Company**—The Ideal tire and tube repair kit is the feature of this line. The kit consists of a collection of things very useful in ordinary tire trouble. It does not pretend to be a garage vulcanizing equipment. Laced boot, inside patches, nail puncture plugs, cut gum, cement, talc, valves and friction cloths are all included.



# Automobile Storage Battery Still Popular

## Increasing Use of Electric Cars Enlarges Its Field

**T**HE MANUFACTURE of storage batteries is on the increase, despite the fact that magnetos and lighting generators are more and more coming into their own. This apparent contradiction is explained by the growing popularity of the electric automobile for both pleasure and commercial uses, it being quite safe to state that electric vehicles increase in at least the same proportion as do gasoline cars.

A variety of storage batteries was shown at the Garden during the first week. They were of varied size and design, according to the different use for lighting, ignition or starting purposes. Ignition batteries constituted the majority, but electric lighting systems have been bidding battery makers to adapt their products to the new demand, and a number of large companies are now in the market with a complete line of batteries adapted to serve as regulators and equalizers in a lighting generator system. The concerns represented were as follows:

**Edison Storage Battery Company, Orange, N. J.**—This company showed several sets of its light-weight cells, arranged in batteries for propulsion and other uses. The principal points of design and chemical composition having remained unchanged, a few details were improved by the maker during the past year. The chief innovation is the use of a combined filler opening and relief valve in the new models, where separate openings were used in former models. The exhibit also comprises a device for testing the cells for impact strength, this apparatus being a copy of the testing machine used by Mr. Edison at his works.

**Electric Storage Battery Company, Philadelphia**—The exhibit of this company consisted of a display of its Exide sparking batteries, which come in three styles, as Exide sparking batteries, as Exide Duplex sparking batteries and Exide Emergency sparking batteries. The first type comes in four sizes of plates, consisting of one, two, three or four cells, with a voltage ranging from 2 to 8. In addition to these products, the company makes a storage battery to be charged by the lighting dynamo as an adjunct to the illuminating system. Besides, it produces the Chloride and Tudor accumulators for service in stationary plants.

**Geiszler Brother Storage Battery Company, New York, N. Y.**—The battery manufactured by this company is non-sulphating and therefore durable. It is made in two types, according to the application, for either ignition or lighting work. They may be left standing for some time without charging, and no depreciation is to be expected from this practice, according to the maker. The ignition battery type is made in five sizes, ranging in voltage from 4 to 8 and in capacity from 40 to 80 ampere hours. The lighting batteries permit of heavy discharge rates and they all deliver current at 6 volts. The three types, if discharged at 1, 3, 5 and 10-ampere rates respectively, have the following capacities: small size, 110, 81, 70, 60 ampere hours; medium size, 130, 111, 90, 75 ampere hours; large size, 150, 120, 110, 95 ampere hours. The lighting batteries are suitable for working independently or in conjunction with an electric lighting generator.

**Gould Storage Battery Company, Depew, N. Y.**—The line of this company comprises batteries for propulsion purposes in electric vehicles, as well as for lighting and sparking on gasoline cars. As to the use for illumination the battery may be used either for a straight storage-battery lighting system or to co-operate with the lighting generator driven by the motor. In

the latter case it may be preferably made to serve the ignition as well, although some engineers choose to serve the engine by an independent magneto. The company also makes plain sparking batteries, which have a capacity ranging from 40 to 80 ampere-hours, the cells being enclosed in either a rubber or wood case. The lighting cells are carried in a wood or metal container, being made in five capacities, namely, 40, 60, 80, 100 and 120 ampere-hours.

**Narragansett Chemical Company, Providence, R. I.**—This company builds the Meteor storage battery, which may be used for producing the sparks in the cylinders, as well as to supply current for the lights used on the automobile. It consists of three cells connected in series to give 3 volts, the capacity being 60, 80 or 100 ampere hours respectively for the three types made. The smallest type is made for ignition work only, being 7.5-8 inches long, 5.1-2 inches wide and 6.5-8 inches high; the cells are carried in a composition case. The battery weighs 27 pounds. The two larger types are both suitable for combined ignition and lighting work, and each has a height of 9 inches and a width of 6.1-2 inches, while the 80-ampere hour design is 12 inches long and the maximum size 14.3-4 inches.

**National Carbon Company, Cleveland, O.**—The Columbia battery made by this company was originally designed for ignition purposes, but it has been adapted to form part of the generator lighting system. This new type of battery is the Multiple; it is made in three different sizes so as to give a choice of the most suitable design to co-operate with the magneto, if the battery is used for ignition service only. The lighting battery is of the Multiple design, and its capacity is sufficient to keep side and tail lights burning for 50 continuous hours.

**Niagara Lead & Battery Company, Niagara Falls, N. Y.**—The Salom, made by this company, is constructed both for lighting and for propelling electric vehicles. Because of the pertinency of this first-named subject the lighting battery attracted more attention than the other types. It consists of three 2-volt cells of a capacity of either 80 or 100 amperes, the cells being connected in series. The battery is exchangeable at the numerous stations established by the company throughout the country.

**U. S. Lighting & Heating Company, New York, N. Y.**—The majority of National batteries made by this firm are designed either for propulsion or ignition purposes, although it also manufactures a lighting battery. This is a 6-volt, 100 or 120-ampere hour battery composed of three cells. The sparking batteries range in capacity from 20 to 75 ampere hours and in voltage from 2 to 10. High-class material is used throughout the construction. The electric vehicle battery plates are all 8.5-8 inches long, ranging in width from 4.7-8 to 5.3-4 inches and in thickness from .109 to .210 inch. The various sizes are used in accordance with the requirements of the vehicle to be equipped.

**Willard Storage Battery Company, Cleveland, O.**—This concern exhibited a complete line of its batteries designed for combined starting, ignition and lighting use. The battery is so constructed that it may be made to act as an equalizer for the output of the electric generator carried on the car and to distribute the current to the ignition and illuminating systems. It is part of many dynamo lighting systems and is made in capacities from 35 to 90 ampere hours. The special Elba lighting battery is made in sizes up to 180 ampere hours.

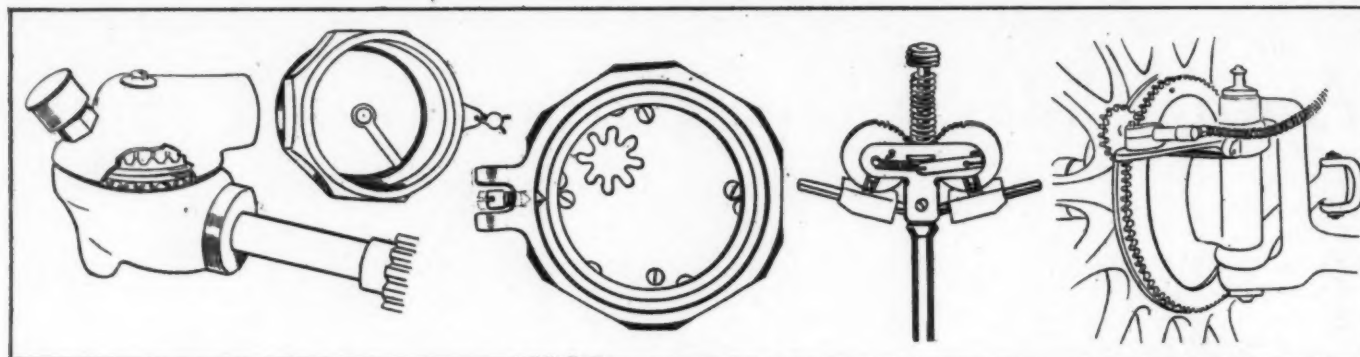


Fig. 1—Jones swivel joint. Fig. 2—Jones Hub odometer drive. Fig. 3—Veeder odometer drive. Fig. 4—Standard speedometer governor. Fig. 5—Star speedometer drive from hub

## Speed and Other Indicators for 1912

Comprising Centrifugal, Spring, Pressure and Electric Types

**S**PEEDOMETERS as they are found on the 1912 market are of four types: The simplest class is the centrifugal type, in which a governor is deflected from its axis of rotation in proportion to its speed, and its deflection transformed into the movement of a lever actuating a hand on the indicator dial. The second type comprises a rotating magnet dragging along a cylindrical indicator dial against the tension of a spring, or against its own momentum, the drag being proportional to the speed of the rotating magnet. In the third class air or a liquid is put under pressure and acts upon a pressure meter giving readings in miles per hour. Furthermore, there is the electrical speedometer, consisting of a magneto generator driven off the wheel hub and a voltmeter with miles-per-hour readings on the dashboard. In all cases the original drive is taken from the hub and transmitted, through a flexible shaft or an electric cable, to the indicating mechanism on the dashboard.

Distance meters, or odometers, as they are generally called, are

either attached to the wheelhub directly or the drive is transmitted to the dashboard mechanism, where it actuates a set of gears recording the distance in units and tenths of miles.

Both types of meters are frequently combined; yet the speedometer is more often found alone than the odometer, as the speed laws necessitate the driver's vigilance to limit the speed of the car within the scope of the law. As a matter of comfort, a clock is often found in combination with the speedometer, or the speed-odometer, and while the practice has not as yet become very general there is a decided trend toward the installation of a gasoline meter on the dash, by means of which the driver can tell at any time and at a glance how much fuel there is in the tank and estimate how far he may go without taking on more gasoline. This latter class of indicators is not included in stock-equipped cars, save for a few exceptions, but there is a likelihood that a good many 1913 and almost all 1914 products of the first class will be furnished with the gasoline gauge.

### Many Centrifugal Speedometer Designs

The great problem in speedometer construction is to make them vibration-proof in order to have nothing but the speed of the car influence the reading on the dial. This problem has been solved in practically all 1912 speedometers of standing. To eliminate lost motion, which likewise disturbs the accuracy of indications, swivel bearings are more and more being introduced.

The Jones speedometer, made at New Rochelle, N. Y., is of the centrifugal type. It contains a centrifugal governor attached to a shaft rotated by flexible shaft drive from the wheelhub of the car. Arranged on the same shaft with and attached at one of its ends to the centrifugal governor is a sensitive coiled spring, which at its other end is connected to the indicator hand on the dial. As the governor shaft rotates its weighty portion is thrown away from the shaft and the slidable member, holding the weight to the shaft and also holding one end of the spring, is drawn up toward the weights. This has the effect of drawing the spring toward the governor to an extent proportional to the speed of rotation of the shaft, and the straight movement of the spring turns the hand on the indicator to the correct mark. As the speed falls off, the indicator returns to the zero position by the tension of a watch spring. The governor is a metal ring set at an angle of about 45 degrees to the rotating shaft when at rest, and held thereto by slidable rings. As speed increases, the angle of the governor against the shaft increases until it reaches 90 degrees, which gives the maximum mark on the dial. In the latest type of Jones speedometer, the De Luxe, there are two governors, one being for the low speeds up to 15 miles an

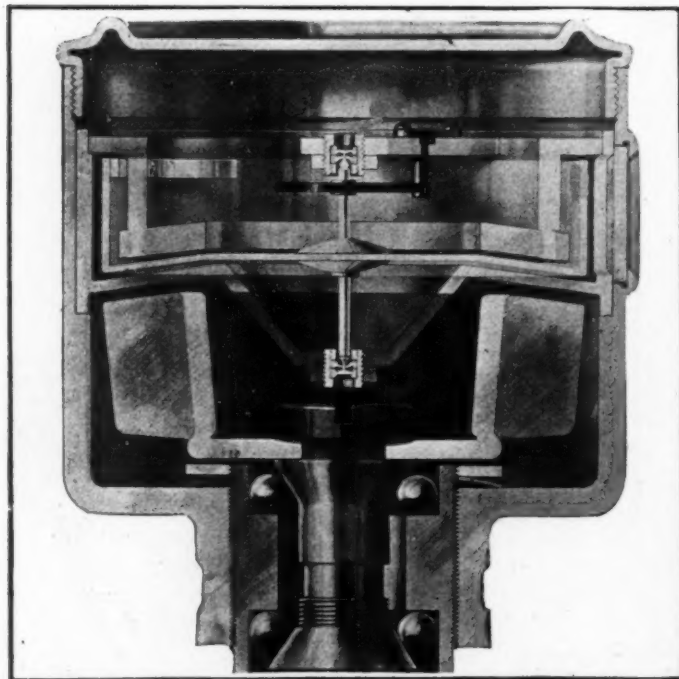


Fig. 6—Mechanism of the Warner magnetic Autometer with the case removed



hour, above which the heavier governor takes the work, with the small one running as an idler on the shaft.

To prevent twisting of the flexible shaft when the car turns a curve, the connection between flexible tubing and governor shaft is made in the shape of a swivel bearing, Fig. 1. This is a ball bearing, with a large grease cup on top to permit of copious lubrication, and an annular oil-soaked felt washer between the metal halves seen in Fig. 1. In addition to this feature there is, on the De Luxe model, a new type of trip resetter, consisting of two small worm gears arranged on aligned shafts below the odometer-number gears. When the odometer operates two small gears are not in mesh with the number gears, but if it is desired to reset the odometer to any degree the buttons—there are two, one on each shaft—are pressed in or out to mesh with the respective number gear and turned to bring it to the right position.

The company also shows a new hub odometer, Fig. 2, the construction of which is the same for all meters, while the front view varies with the style of the car the odometer to which it is fitted; it takes the place of the regular hub cap. The odometer has space for nine digits. The hand seen in the figure rotates with the wheelhub and its motion is transformed by a gear to rotate a number of pinions carrying the indicator numbers.

Another exhibit was the recorder which is driven by flexible shafting and a time clock to be described in detail in a later issue.

The Standard Thermometer Company, of Boston, Mass., showed a different type of centrifugal speedometer. The governor shaft is driven by flexible shafting and carries two weights arranged so that they can be slid along two radial rods. The rods are fulcrumed on a ring held in place on the rotating shaft, so that the angle formed by them with the shaft is variable. The governor weights carry a pinion each, as is shown in Fig. 4, and the axes of the pinions are held at a constant distance by the cross rod illustrated. At the same time the spring tends to hold the weights in the highest possible position. The pinions on the weights mesh with a rack having a sliding arrangement on the governor shaft, and, as with increasing rotative speed, the cross rods overcome the tension of the spring and are thrown apart, the pinions remaining in mesh with the rack draw down the latter. The upper portion of the rack meshes with a gear train actuating the hand on the indicator dial.

The feature of the Veeder Manufacturing Company's exhibit was the hub odometer, which is continued without any essential changes. It is suitable for use on pleasure cars as well as for truck work. The Form J tachodometer, which is the company's speedometer, was also shown, but like the dash odometer and the form B, which is attached to the knuckle, it has undergone no important modifications.

The Star speedometer, made at Danville, Pa., is of the centrifugal type. The method of driving is from the hub of the front wheel as shown in Fig. 5. The big gear attached to the hub drives the small pinion meshing with it, which is held to a stationary base plate and actuates the flexible shaft, transmitting the drive to the speedometer shaft. In this new model the trip resetter is arranged on the side of the case, instead of at its back, where it formerly occupied an inaccessible position. Chelsea movement is used.

The speedometer of the Hoffecker Company is built on the centrifugal principle, having a perfectly balanced governor, the bearings of which run on high-test steel balls. A 1912 feature is the new lower gear section of the swivel type, responding readily to every motion of the car wheel.

The Forse speedometer, made by the Forse Manufacturing Company, is of the centrifugal type, the governor comprising a steel flywheel having four radial channels in which 1-2-inch steel balls are placed. A four-armed yoke rests on the balls. As the wheel revolves the balls tend to fly outward and in doing so they push up the yoke which transmits this motion to a lever actuating the hand moving on the dial. The weight of the yoke and balls brings the indicator back to zero when the motion is stopped, and the indication is always in proportion to the rotary speed of the governor shaft.

The Cleveland Speed Indicator Company, Cleveland, O., makes an indicator showing the three important factors of automobile running—namely, time, distance and speed. The time feature shows the actual running time consumed in the car's operation and forms a very good method of judging the efficiency of the car. The unit adopted is one-thirtieth part of a mile, and the principle upon which the instrument works is the same as that which actuates the escapement of a clock. Two odometers are employed, one of which records daily or trip distance, while the other records for the season. The indicator is operated by means of a flexible shaft driven by the front wheel, which winds the clockwork every 176 feet and revolves 168 times to the mile, or about one-fourth as fast as the front wheel.

### Magnetic Types of Speedometer

The Warner Instrument Company's principal change is its new trip resetter, which, by a single turn, brings the trip recorder back to zero. The second resetter which is provided regulates miles and tenths, so that by its use any desired mileage may be made to appear on the indicator within a short time. Fig. 6 illustrates the construction of the Warner Autometer, which is of the magnetic type. A tungsten steel magnet is held in place by a brass cup, and a field ring of steel used to concentrate the lines of force. The rotating magnet creates a drag or pull on the cylindrical dial showing the speed in miles per hour, the numbers passing by a finger point on the front opening of the device. The drag of the rotating magnet is proportional to its speed, and as the magnetic lines flow from the magnet to the field ring they pass through the aluminum dial, which, though not paramagnetic itself, is responsive to this rotary pull. The drag is counteracted by a hairspring which holds the aluminum disk in the position corresponding to the speed of the magnet and which returns the dial to the zero position if the magnet ceases to rotate. The speed scale is pivoted on jewel bearings. A change worthy of mention is the use of a permanent key on the side of the casing in place of the old-fashioned clock key formerly used; also, the flexible shaft, which is made of two sizes of wire overlapping each other, and finally a swivel bearing for the point where the flexible-shaft motion is transformed into rotation of the magnet.

The Stewart & Clark Manufacturing Company's speedometers are made lighter than were last year's models. They operate on the magnetic principle, as the type just described, but there are some details in which the applications of the principle

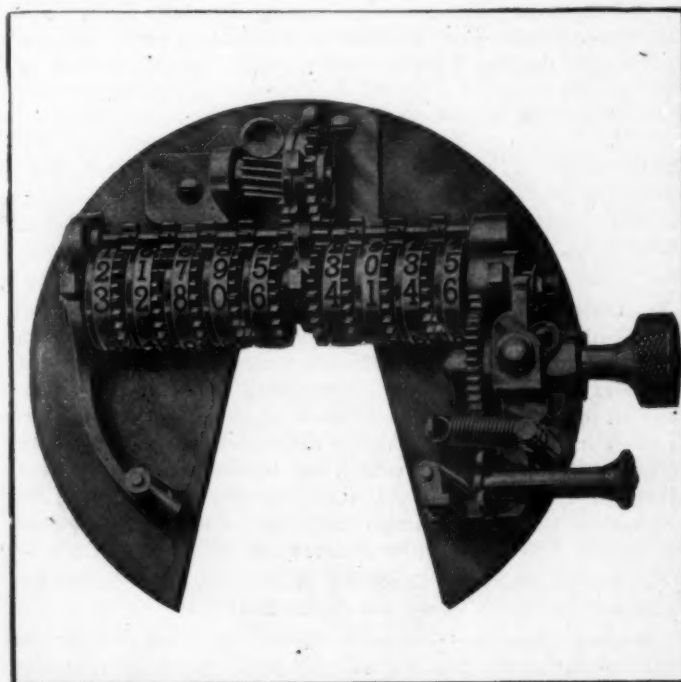


Fig. 7—Odometer mechanism and celluloid disks of Stewart & Clark meter

differ in the two makes. This year the Stewart & Clark speedometers are equipped with a disk of a new metal not affected by atmospheric changes of temperature or moisture. The clock is not only rim wound, but the time is also regulated by a rim-setting mechanism. The new barrel odometer has a series of rotary celluloid cylinders, on which the ten numerals appear. The mechanism comprises a worm gear actuating a shaft and pinions which carry the numeral cylinders. The main sprocket is cast of malleable iron, while the pinions are of fiber to insure noiseless performance. An unbreakable flexible shaft and a drop-forged swivel joint are other improvements of the line of this concern.

### Pneumatic and Hydraulic Designs

The Troy Carriage Sunshade Company exhibited its pneumatic speedometer, consisting of an air-compressing mechanism which is directly driven by gears from the wheel hub, the air being forced through an aperture and a flexible tubing to a mechanism indicating the miles per hour corresponding to the velocity of the air. Around the thin flexible tube through which the air passes to the speed indicator a wider tube is fitted, through which pulsatory air is transported to actuate an odometer mechanism. The reading of the odometer is in miles and tenths up to 100,000 miles.

The Casgrain speedometer is driven by a flexible shaft from the hub. The shafting actuates a paddle-wheel inclosed in a casing and filled with a high grade of mineral oil. The pressure imparted to the liquid by the paddles is measured, the measure indication being expressed in the corresponding miles per hour on a rotating dial.

### Electric Speed Indicator

The Hopkins speedometer, made by the Electric Speedometer Company, comprises a small magneto generator which is gear-driven by the left front wheel and connected to a voltmeter on the table, fitted with a dial marked in miles per hour. The odometer consists of a magnet-operated counter, a make-and-break device and a flexible electric cable permitting the installation of the indicator on any part of the car. The contact is closed at every tenth mile, when current flows from a battery to the indicator case, magnetizing a solenoid which then attracts an armature. This has the effect of rotating the number disk to the next tenth and after the ninth tenth has been finished to move the odometer to the next unit.

The Recording Speedometer Company, Newark, N. J., makes the Speedograph, which consists of a recording pencil, actuated by flexible shafting from the wheels, which travels 3-4 inch up-

ward or downward for each 1-2 mile made by the vehicle. The distance being thus recorded on a strip of paper on which the pencil writes, the paper is drawn across the field of the pencil by a chronometer mechanism, moving the paper at the rate of 3 inches an hour. In this way the time of operation and the mileage of the vehicle during all intervals of that time are given, so that the speed of travel at any one time may be readily calculated. The Speedograph is intended specially for truck service.

### Other Indicating Devices

Among other indicating apparatuses exhibited was the Van Auken vanometer, a dashboard indicator of the gasoline available in the tank. This gauge comprises a U-tube of glass, open at the top and incased in a nickel housing so that the front of the glass tube is left visible. The glass is filled with a red liquid. The gauge is installed on the dash and its short leg connected by metal tubing to a coiled tube extending from the top of the gasoline tank to the bottom. After completing the installation, the gasoline is run into the tank, and the pressure of the air forced up in the coiled tube by the rising gasoline is transmitted to the red indicating liquid which rises to the top of the tube as the tank is being filled. The level of the red liquid falls in proportion to that of the fuel so that the driver can tell at a glance how much gasoline there is in the tank.

The Smith gasoline meter comprises a float in the gasoline tank, a flexible cable attached to the float and leading through a tube to the indicator proper on the dashboard. The indicator consists of a dial on which there is a scale of gallons, and an indicator hand connected to the float by means of the cable, so that, as the float falls with the supply being used, the indicator hand is drawn to point to lower values on the round dial.

The Invincible tire gauge of the United States Gauge Company, New York, is constructed on the principle of the Bourdon steam gauge. The air streaming out of the tire enters a bent tube which is connected to an indicator hand carrying a small pinion. The hand shows the pressure in pounds per square inch on the dial, and is retained in position by a pawl engaging the pinion. By pressing a release button the indicator-hand pinion is freed and returned to the zero position by the tension of a spring.

Speedometers are included in the stock equipment of many 1912 cars, the high-priced automobiles being generally equipped with a combination instrument serving as odometer at the same time and carrying a clock at its top. In speedometers sold separately appearance plays an important part and it is in conjunction with this principle that speed indicators for this year have been attractively designed.

## Automobile Lubricants Attracted Much Attention

**L**UBRICATING oils and greases attracted their full share of attention at the New York shows. Non-carbonizing features of the cylinder oils were made prominent features of the exhibits. The oils exhibited were uniformly good and all those who showed their wares at the exhibitions achieved success in the way of furthering their sales. One of the noteworthy features of the exhibit of lubricants was the great trend toward specializing the oil. Following is a résumé of the companies handling lubricants in so far as their representation at the big New York shows is concerned.

**Albany Lubricating Company, New York City**—This company makes Cook's auto transmission lubricant.

**Baum's Castorine Company, Rome, N. Y.**—Cyloiline for the lubrication of cylinders will not burn, smoke or carbonize. This company's line includes auto soap, grease, non-fluid oil, graphite grease, auto metal polish, hand soap, neatsfoot oil,

gear oil, sperm oil, leather dressings, varnish renewer and soap-stone.

**Bliven & Carrington, New York City**—The E-Z-Way grease made by this company is put up in grease gun cans for the more easily accessible grease cups.

**The Joseph Dixon Crucible Company, Jersey City, N. J.**—manufactures the Dixon graphite lubricants for transmission and differential gears, Dixon's graphite cup greases, motor chain compound, motor graphite and Dixon's Graphitoleo.

**The Harris Oil Company, Providence, R. I.**—The cylinder oils manufactured by this company are of three grades, light, medium and heavy. Its line includes also Trans-Compound, a lubricant for transmissions and differentials, gear and transmission oil, Super-Heated steam oil made especially for Stanley steam cars, grease for use in compression cups, and graphite grease for chains and gears.



**George A. Haws, New York City**—Panhard Oil for cylinder lubrication, fluid and anti-fluid transmission greases, cup grease for compression cups, axles, bearings and steering posts, graphite lubricant for use in compression cups, transmissions or on chains and cork graphite compound for gearcases or differentials are the products of this company.

**International Acheson Graphite Company, Niagara Falls, N. Y.**—Oildag, for cylinder lubrication, and Gredag, for use in transmissions, are among the prominent products made by this company.

**Keystone Lubricating Company, Philadelphia, Pa.**—Keystone motor oil for lubricating cylinders and Keystone grease are the products of this concern.

**Wm. P. Miller's Sons, Long Island City, N. Y.**—Pan-o-lite is a highly filtered cylinder oil. Miller's E grease for use in compression cups, on chains and for all requirements, graphite grease, Excelsior fibrous oil, and Duffy's gear grease are included in the manufactures of this company.

**New York & New Jersey Lubricant Company, New York City**—Motorol for cylinder lubrication is the best known product of this company, which makes Non-Fluid oil, specially adapted to all parts of the car.

**L. Sonneborn Sons, New York City**, manufacture Amalie cylinder and transmission oils, auto soap and metal polish.

**The Texas Company, Houston, Tex.**—It is claimed for Texaco motor oil for cylinder lubrication, one product of this company, that it keeps the engine free from carbon. Texaco gasoline is also a product of this company.

**Vacuum Oil Company, Rochester, N. Y.**—This company manufactures Mobiloil for cylinder lubrication, making a different grade for every type of motor. It makes Vacuum transmission greases and Mobilubricant for use in compression cups and for packing steering gears as well.

**The White & Bagley Company, Worcester, Mass.**—Oilzum cylinder oils are non-carbonizing. The product of this company includes also Oilzum cup lubricant, transmission lubricant, fibrous, graphite and gear lubricants, Washzum for cleaning varnish and painted surfaces, and Cleanzum, an antiseptic hand cleaner.

**Wm. R. Winn, New York City**—The Runeasy cylinder oils which this company makes act quickly, flow freely and will stand high temperatures. Other products of this company are Runeasy cup grease and non-fluid oil, Cleaneasy auto soap and Everbryte metal polish.

**Wolverine Lubricants Company, New York City**—Wolf's Head oils for cylinder lubrication are well filtered and are free from carbon. The Crystal oils and the Wolf's Head greases are the other products of this company.

## Accessories Not Included Under Special Classification

**T**HIS review of general accessories includes all those exhibiting concerns which could not be included under any one of the principal classifications covered in this and previous issues, or which for some reason were not included under the main headings where they properly belong. This assembly comprises a number of useful sundries, catering to the comfort of the owner and driver, as well as increasing, in some cases, the economy of car operation.

**American Metal Hose Company, Waterbury, Conn.**—The American flexible metal gas tubing is made to take the place of rubber tubing in conducting gas where it is not possible to install a stationary pipe for the purpose. Gas tubing is made in two styles, viz., single or double-grooved, either of galvanized steel or brass, and covered with brass, copper or steel wire braiding.

**The American Oil Pump & Tank Company.**—Besides a line of tanks for the storage of gasoline this company manufactures the long-draw pump, for public and private garages, and the American wheel tank for gasoline, a roll-top oil cabinet and the American gasoline filter.

**Baldwin Chain & Manufacturing Company, Worcester, Mass.**—Detachable and riveted chains of various sizes for automobile use are made by this concern; in addition the company turns out a complete line of the necessary sprockets for standard automobiles. A recent addition to its line is the Brown Patent Steering Gear, one of the chief merits of which is the overcoming of the tendency to "backlash." The novelty of this gear lies in the means employed to replace line contact with broad, flat and circular surfaces so arranged that any force applied to the ball lever will react on these surfaces and at the same time so arranging the parts that a correct degree of reversibility or locking may be obtained.

**Brilliant Renovating Company, Jersey City, N. J.**—The Renovator made by this company is used to disguise scratches on bodies. It is a carefully prepared varnish which, while rubbed over the surfaces, cleans them and covers them with a thin, brilliant coat. It also prevents injurious effects of the atmosphere.

**F. S. Carr Company, Boston, Mass.**—Ducks, mohairs and

other fabrics suitable for automobile tops are manufactured by this company, in addition to Carr's Patent Curtain Fastener, which, it is claimed, will hold curtains secure in the heaviest wind.

**L. S. Chadwick, Bantam, Conn.**—The Chadwick road guide is a dashboard patch indicator of circular design, which is rotated at proper speed by a flexible shaft drive from the front wheels. The indicator has a glass front permitting a view of the revolving chart, which has a number of holes punched in it. The latter allow of spring-urged keys entering them, whereby a variety of signals are displayed on the front of the device. These serve to warn the motorist of dangerous turns, crossings, speed traps, etc.

**The Chandler Company, Springfield, Mass.**—Name plates and stampings of various kinds, enameled and plain, feature the product of this concern. The work of this company is to be found on the radiators of many of the more prominent cars in this country.

**Christian Brothers Company, Brooklyn, N. Y.**—Peerless solder, made by this company, is used for mending cracked cylinders, water-jackets, radiators, tanks, etc., without heat. It may be subjected to any reasonable degree of heat immediately after without being affected. It is made in two colors, black and aluminum.

**C. Cowles & Company, New Haven, Conn.**—The line of automobile trimmings, mountings and hardware produced by this company is most comprehensive. It consists of combination dash ventilators with lights, disappearing electric corner lights, limousine and coupé pillar and dome lamps, ventilators, mirrors, speaking tubes, anti-rattlers for windows, toilet cases, bouquet holders and a hundred and one other conveniences and fittings for the well-equipped car.

**Dover Stamping & Manufacturing Company, Cambridge, Mass.**—A full line of gasoline and oil funnels and measures is made by this company as well as the Tourist oil and gasoline kit and the Dover gasoline emergency tank.

**J. Eavenson & Sons, Inc., Camden, N. J.**—The Jesco automobile soaps and metal polishes of this concern have become

deservedly popular. For the former it is claimed that, being perfectly neutral, it is absolutely harmless for cleansing the highly varnished surface of all wood-work or painted parts of high-grade automobiles.

**French Compression Fluide Company**—This company is producing a compound that is a carbon remover and lubricant combined. It is a blend of light California oils carrying a carbon solvent. When put into the motor it forms a chemical reaction, precipitating the carbon in granulated form, thereby allowing the carbon to be easily blown out through the valves and muffler.

**Globe Machine & Stamping Company, Cleveland, O.**—Among the new features of the Globe steel battery boxes, is the grommited hole for battery wires. While the ordinary Globe boxes are without wood lining, boxes with wood lining may be had for a small additional charge. Gas tank and combination boxes are also made.

**Hall-Thompson Company, Hartford, Conn.**—The Wonder Worker specialties made and marketed by this company include metal polishes, soaps, radiator cement, cylinder oils and greases, decarbonizers and carbon removers, non-freezing compound, and rust removers, metal finishes, valve-grinding compound, tire and rim paints, tire repair outfits and a score of other articles of every-day use to the automobilist.

**Hartford Suspension Company, Jersey City, N. J.**—This company has just begun to manufacture its combination starter and lighting dynamo, the starter being an electric motor 4 inches in diameter and 7 inches long. It is connected to the automobile crankshaft with a very high reduction and revolves at from 5,000 to 6,000 revolutions a minute. The lighting dynamo is 3 1/2 inches in diameter and 5 inches in length.

**Hayes Manufacturing Company, Detroit, Mich.**—The metal tool, tank and battery boxes manufactured by this firm are of the best grade of sheet steel and are capable of standing the roughest usage, vibration and exposure. They are all fitted with the Hayes special lift lock.

**The R. M. Hollingshead Company, Camden, N. J.**—Among the many accessories made by this company, and which are being marketed in quantities throughout the United States are the Whiz automobile specialties, including soap, metal polish, Kleer-Glass, Roadside Hand-Cleaner, Rapid Repair Enamel, Sponge Grease, Waterproof Cushion Dressing, Nugloss and Krystal Soil-Off.

**Hydraulic Oil Storage Company, New York City**—Its product is a storage system for oil or gasoline, by the use of which the liquid cannot be drawn from the container except through one positively controlled passage. The maker states that no leaks are possible with the apparatus.

**International Metal Polish Company, Indianapolis, Ind.**—Blue Ribbon Auto Gloss and Furniture Polish is a new and scientific preparation which restores life and imparts a lasting brilliancy to all highly-finished or polished surfaces which have become dead or lost their original gloss or brightness.

**James Thermos Company, New York City**—The James Thermos, a system for heating the interior of closed cars, as well as the feet of the driver, is made by this concern. Heat is transferred by means of water, which is warmed by a gasoline burner heating a pipe coil, disposed at a suitable place on the car. Besides increasing the comfort of the passengers, the device helps to keep the circulating water from freezing and to preheat the gasoline flowing to the carburetor.

**William R. Laidlaw, Jr., New York City**, is the American agent Burbank motor top cloth, an English fabric much used in this country by top builders. It is 60 inches wide, thus permitting of the making of even the largest top without necessitating a seam, and it is claimed for it that it does not leak, crack, peel, blister or chafe through.

**Marvel Solder Company, New York City**—This concern puts up in collapsible tubes a solder compound that will be

found useful in effecting repairs on the road, and should find a place in every tool-kit.

**John W. Masury & Son, New York City**, manufacture a line of paints and varnishes suitable for the automobile trade. The factory is in Brooklyn, with branches in Chicago, Minneapolis and Kansas City.

**The Metal Shelter Company, St. Paul, Minn.**—The Pruden System garage, a fireproof construction of portable type, has attracted much attention in the automobile world. No framing is required and no wood is used in its make-up. All the material is shipped to the buyer in unit sections with patent interlocking edges ready for immediate erection. The side walls are painted and sanded to represent stone.

**The Meteor Auto Tank Company, Middle Haddam, Conn.**—The Meteor tanks for the storage of acetylene gas for the headlights of an automobile or motor boat are warranted not to leak and to be safe for transportation under all conditions. The tanks are made in nickel and in copper.

**C. A. Mezger, New York**, has produced a plug which is known as the Soot-proof. It is cored in such a way that it is self-cleaning and in this way the spark is not apt to be interfered with by a speck of carbon between the electrodes. There are two electrodes, the central being a straight projection, while the side is bent over to form the correct width of gap.

**The McM M. M. Company, Marshalltown, Iowa**, is manufacturing what is called the V-ray spark plug. There are several electrodes in the plug across which the spark may jump. A feature of the plug is that it consists of but two parts.

**Morrison-Ricker Manufacturing Company, Grinnell, Iowa**—Grinnell "Rist-Fit" and ventilated gloves and one-finger mittens, specially made for automobile use, are well known for their durability and comfort. The stiff cuffs are always kept in place by the patented "rist-fit."

**L. J. Muttly Company, Boston, Mass.**—This company is turning out an excellent quality of mohairs and cottons specially designed for tops. The interlining Bull Dog proofing is all done at the company's mills; it is compounded from pure Para rubber and other secret ingredients.

**Narragansett Chemical Company, Providence, R. I.**—Reflectolite, a liquid metal polish, is being marketed by this concern. Among the claims for this polish are: Absence of grit, acid, alkali or ammonia; quickness of action; deep luster that retains its brilliancy, and freedom from deposit or sediment in the can. Meteor soaps, oils and greases are also made by this company.

**The National Coil Company, Lansing, Mich.**, is making a complete line of magnetos, dash coils, kick switches, box coils, battery boxes, primary coils, switches and spark plugs. There are several models of each of these and they are made along the lines of up-to-date engineering practice.

**National Rubber Company, St. Louis, Mo.**—The product (named Tirenew) of this concern is a liquid rubber dressing. The liquid part of which evaporates quickly, leaving on the tire a coat of pure rubber, which enters every small cut, prevents its development and thereby the decay of the tire casing. Incidentally the appearance is improved by this treatment, as the dressing contains a chemical, giving a white effect to the rubber coating.

**The Pantasote Company, New York City**—This concern, which manufactures the famous leather substitute which bears its name, not only specializes on grades of the material suitable for automobile tops, but its product is used in the upholstery of Pullman cars and other palatial equipages. It is a two-fabric construction—a base of strong lining fabric followed by a layer of cementing gum, then a stratum of fine cotton, with the waterproof outside coating of Pantasote gum made in imitation of pebble or long grain leather under a secret process. The company also manufactures Agasote, a substitute for wood in the construction of automobile bodies and all sorts of interior and exterior construction work.



**Perfect Window Regulator Company**—In the large two-story factory of this company is manufactured the device which gives it its name. With this device it is possible to raise and lower the windows of a closed car by the simple turning of a handle. Turning in one direction raises the window, and turning in the opposite direction closes it. The window is held at any desired position, falling or breakage being impossible. The device consists of a cam plate which is attached to the lower frame of sash, two ball-bearing sprockets mounted on steel plates and connected by means of an adjustable steel spacing bar, arranged to take care of variations in length of sash. The two sprockets are rotated through a special chain by turning a handle, engaging with a clutch located in the upper sprocket, handle, engaging with a clutch located in the upper sprocket, provides a positive lock. At one point on the chain is attached a spindle and cam roller, engaging with cam plate, which carries the sash while being raised or lowered. The complete device is attached to the upper and lower inside lining boards and very little fitting is required.

**P. Reilly & Son, Newark, N. J.**—Pure, oak tanned, French and Spanish leather in all colored effects and grains comprise the line of goods made by this company. These leathers are specially designed for the hard wear to which automobile upholstery is subjected.

**S. B. R. Specialty Company, East Orange, N. Y.**—Besides the S. B. R. and Essex muffler cut-outs, this concern has placed on the market Rapidcut, an abrasive powder for grinding in valves; Smooth-on-Iron Cement, for repairing cracked water jackets and leaky radiator tubes; the Giant Auto Jack, and the Essex valve-timing rod. The latter instrument indicates the exact location of the piston, thus making it possible to set all valves and properly time explosions. The company is also marketing the Neats clamp for wire cables.

**John T. Stanley, New York City**—This manufacturer markets Shofo, a cleansing compound for garage use. It is composed of castile soap, purely powdered pumice stone and green olive oil. Another product is Mobo, composed of a vegetable oil, which is a solvent for grease and other impurities that are found on the car.

**Syracuse & Elbridge Glove Company, Syracuse, N. Y.**—The automobile gloves made by this company are made from dogskin, horsehide, lamb, English cape, goat, reindeer and buckskin. They are double in the hand, seamless in front of the fingers, reinforced under the thumb and seamless under the thumb.

**S. & S. Shock Absorber Company, Detroit, Mich.**—A shock absorber of cylindrical design which is entirely independent of the spring, being mounted to connect the axle with the frame, is the product of this company. It is made of strong material and designed for much higher stress than is practically encountered, according to the makers. It comes in four sizes to be used with cars of various weights.

**J. M. Tarzian & Company, Brooklyn, N. Y.**—The Tisafine Hand Paste made by this firm is ideal for cleaning up after a dirty job on the car, leaving the hands soft and smooth.

**Joseph Tracy, New York City**—Fan dynamometers for testing motors on the block, ascertaining the amount of power delivered to the road wheels of an automobile on high gear and testing stationary engines constitute part of the line of this concern. Test blocks and universally adjustable motor supports for factory and garage use are also manufactured.

**U. S. Metal & Manufacturing Company, New York City**—It is claimed for the Columbia Lock Nut made by this concern that it is not only fool-proof, but that the greater the strain upon it the firmer it grips, that it straightens the thread of an abused bolt and that it never diminishes its grip in expansion and contraction of metals.

**Valentine & Company, New York City**—Vanadium Quick Finishing Varnish, the product of this company, dries free from

dust in two hours and hard over night. It is heavy in body but flows so freely that it may be used on the largest panels without danger of its sagging before setting.

**Vanadium Metals Company, Pittsburgh, Pa.**—This concern produces castings of vanadium-aluminum, an alloy of high strength and light weight. The vanadium used in the process of making the metal not only serves as a scavenger, but increases the uniform structure of aluminum, raising its tensile strength considerably at the same time. Castings may be made of this material which contain no blowholes, thus being applicable for many parts of the car where reliability is a necessity.

**Vanguard Manufacturing Company, Joliet, Ill.**—Straight and zigzag automatic ventilating windshields of various sizes to fit small or large cars are manufactured by this company. The enclosed hinge is silent, dust-proof and positive in all positions, and there are no open spaces for the accumulation of dust and corrosion. Although 6-inch mahogany finish board with brass binding is furnished regularly with the Vanguard product, the buyer is given the option of walnut finish board or rubber strip in place of filler board. By the use of the Vanguard automatic windshield brackets any tubular metal frame stationary shield may be converted into a ventilating shield, which permits of securing the ventilating position with one hand while the car is in motion.

**Velox Polish Manufacturing Company, New York City**—A polishing cloth that needs only to be rubbed on the article to be polished in order to bring out a very satisfactory result is made by this company. It is the Velox Rapid Polishing Cloth.

**Volkmar Auto Starter Company, New York City**—This starter is of the spring compression type. Two powerful springs are contained in a steel case 8 inches in diameter and 7 inches long. The device is connected to the crankshaft in place of the ordinary crank, and its springs are wound up by a few revolutions of the engine. To start the motor the driver presses a pedal, which releases the springs; the latter turn over the motor, so that with the gasoline lead in order and the spark adjusted the engine will start and continue to operate.

**Wayne Oil Tank & Pump Company, Fort Wayne, Ind.**—Gasoline and oil storage systems for both public and private garages are made by this company. The system consists of an underground storage tank, long distance pump and suitable pipes. The oil cabinet is of pine, shellacked and varnished, the inner tank being of galvanized sheet steel. A roll-top cabinet and portable outfit for public garage use are included in the line.

**Whitney Manufacturing Company, Hartford, Conn.**—Milling machines, vises, tool grinders, Presto drill chucks and numerous other tools to be found in machine and repair shops are manufactured by this company in addition to the well-known Whitney roller and block chains and chain belts.

**Wiley & Russell Manufacturing Company, Greenfield, Mass.**—This concern is turning out a fine line of automobile screw plates either in leather rolls or hardwood cases for the repair kit and the garage. Reamers and taps for quick-repair work and breakdowns on the road are also made.

**O. W. Young, Newark, N. J.**, manufactures and markets a long line of automobile specialties, including repair kits, patches, oils and greases, rubber-covered steering wheels, soaps, bow separators and vulcanizing outfits.

### The Aploco Electric Starter

In the January 4 issue, in the self-starter article the description of the Aploco electric starter on page 35 contains the statement that the Aploc device does not differ materially from the Delco. The meaning of this is that the two have virtually the same principle of operation, and it has no reference to the form of construction or to methods of working out of details. To avoid misunderstanding, however, it might be said that in these latter respects the two are radically different.

# Digest of the Leading Foreign Journals

## Some Facts Concerning Benzol—American Construction Dressed Up Abroad— An Inventor Who Was Ahead of His Time

A TAX imposed on benzol recently caused a strike among Parisian cab drivers. They liked this fuel so long as it was cheaper than gasoline. It first became generally known in the automobile world as the carburant used for enriching alcohol at the time when it was still thought possible that alcohol might drive gasoline out of the market as a motor fuel.

The name originated from the fact that it was first produced by distilling benzoic acid in the presence of chalk. Industrially it is made as a by-product when coal is distilled for the purpose of producing either coke or heating gas, the incidental products being ammonia, coal tar and certain light oils. The latter are indiscriminately designated as benzol, but only one of them is the benzol used as motor fuel. While coal is also distilled in the ordinary municipal gas works, no effort is made there for extracting the benzol from the gas product, as it contributes to the illuminating properties of the gas. In the cokeries, on the other hand, the gas product is used for heating only, and the benzol is therefore extracted, having a superior value for other purposes. To obtain it, the gas discharged from the coal retorts is first cooled to 20 degrees, and the coal tars are precipitated, carrying with them a little benzol, which is subsequently regained by distillation of the coal tar. The gas is washed to make it part with the ammonia, but the 15 to 20 grammes of benzol contained in a cubic meter of the raw gas is not condensed by this means. To this end it is necessary to use a solvent which drinks in the benzol with avidity, and this is found in an oil which passes from the coal tar, by distillation, at between 200 degrees and 300 degrees. The separation is usually accomplished by leading the gas from below into vertical cylinders, in which this oil ripples down from one to another of a number of baffle plates. Instead of the baffle plates, wooden screens are sometimes used.

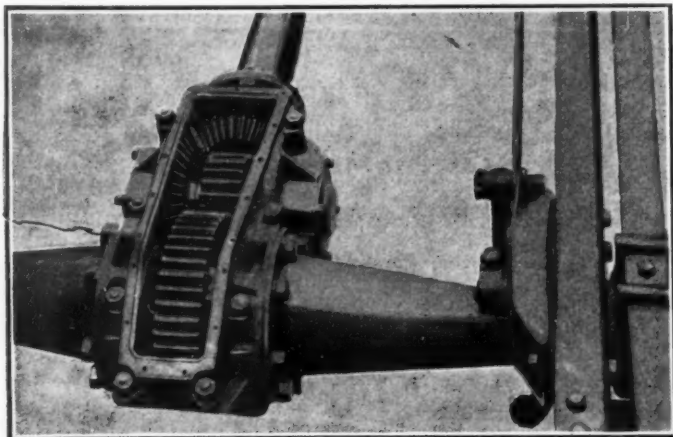


Fig. 1—Bevel and spur gear combination on Lion-Peugeot rear axle

on which the oil falls as a rain. At the end of the operation the oil contains about 7 per cent. of benzol and it is now heated to about 115 degrees in a still, vaporizing the benzol, which is then precipitated by cooling, and gathered. The oil, after being cooled, is used over again. The raw benzol thus obtained has a sharp odor, to be removed by rectification. The first rectification gives light products, or benzol 90; heavy products, or benzol 120 and 160, and a residue which is naphthalene.

The terms benzol 90, 120 and 160 have the following meaning:

If one distills 100 parts of benzol 90 it will yield 90 parts of liquid at 100 degrees. Similarly, benzol 120 yields 90 parts of liquid at a temperature of 120 degrees, and benzol 160 yields 90 parts of liquid at 160 degrees.

The light benzol is washed with sulfuric acid at 66 degrees Beaumé. It goes through two operations in a lead-lined vat provided with a stirring spoon or agitator, and each time there is used 5 per cent. of the weight of the benzol in sulfuric acid. Thereafter the product is washed in water, in caustic soda and finally again in water.

The heavy benzols are treated in the same way except that the acid is 60 degrees Beaumé.

The benzol contained in the coal tar, amounting to about 5 per cent., is also obtained by distillation and is purified as indicated.

Benzol 90 is composed largely of benzine, with a little toluene and traces of three xylenes. It contains about 92 per cent. of carbon, which explains the smoke it emits when burned with insufficient air, as well as the changes in the adjustments which must be made in carbureters before they may be used for this fuel.

Benzol is almost as volatile as gasoline, while of higher specific gravity. One liter of benzol weighs 885 grammes, as against gasoline 680. Benzol is used not only as motor fuel, but also

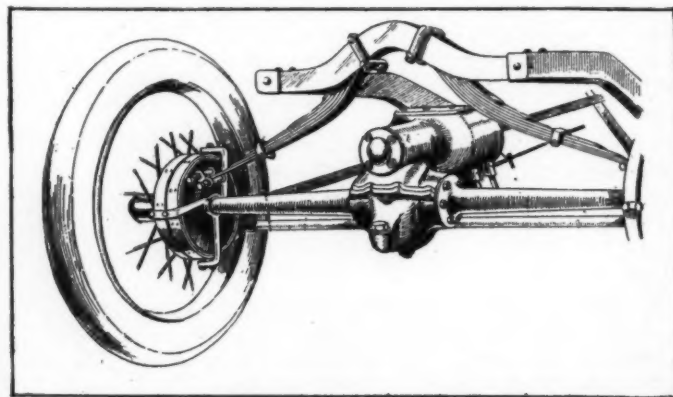


Fig. 2—Spring suspension on B. S. A. new small car

for removing grease from fabrics, for the manufacture of aniline colors and for enriching illuminating gas when the latter needs it.—From *La Pratique Automobile*, December 25.

**BENZOL AND OTHER MOTOR FUELS**—Benzol and the related products, toluene, xylene and naphthalene, belong to the aromatic series of hydrocarbon oils. Benzol is distinguished from benzine above all by the fact that it represents a stable chemical combination and therefore has a constant boiling point, not a curve as benzine and kerosine. This has the advantage that the benzol-air mixture always remains completely combustible, within the limits of mixing-proportion. Nevertheless the chemically pure benzol is not so well adapted for explosion motors as when mixed with the toluene and xylene, which pass somewhat later in the distillation of the tar (or gases). These are much richer in hydrogen, although their boiling points lie considerably higher.

Naphthalene, another product from the distillation of coal, stands chemically very close to benzol, but is solid at ordinary



temperatures. It is very well adapted for motor fuel purposes, in some respects, although its hydrogen content is even smaller than that of benzol. Its advantage resides first of all in that it burns completely when it gets sufficient air, giving no rise to formation of soot. It is probably best known in the form of moth balls, but has been used very successfully for stationary motors, although it is always an inconvenience that it must first be heated sufficiently to pass from the solid to the liquid state. This difficulty can be overcome by dissolving it in benzol, benzine or alcohol, and using the solution as fuel. It is chemically stable and boils at 218 degrees C. The greatest difficulty in the employment of naphthaline lies in the peculiarity that it returns direct from vapor to solid formation, settling as a white scale wherever it cools, thus clogging pipes, etc.—From *Allgemeine Automobil Zeitung*, December 22.

**HOW FOREIGNERS UTILIZE AMERICAN IDEAS.**—Only a glance is necessary for recognizing a well-known American construction in the reduction gearing on the rear axle of the Lion-Peugeot

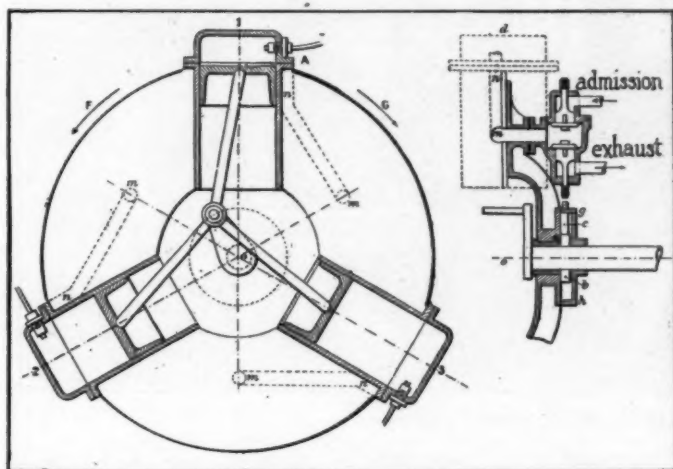


Fig. 3—Sketch from Furst's French patent for a revolving motor—Dated 1887

cars, Fig. 1. It has been considered the most practical design for admitting the shaft drive in commercial vehicles without recourse to the worm driving principle, as it gives a great speed reduction with a small bevel gear and consequently ample road clearance.

Another adaptation of a design feature tried out in a small American car is observed in the spring suspension of a new model turned out by the Birmingham Small Arms Company, as shown in Fig. 2. Unlike its prototype, this model is equipped with worm drive, to make room for which the single cross spring sits up higher than in the original, causing incidentally a stronger spread-thrust at the shackles, while the greater weight on the rear axle must cause more bumping on rough ground, with less comfortable riding and increased tire wear.

Auxiliary coil springs were pooh-poohed in France for a couple of years after they had made their appearance in this country, but now their virtues are respectfully considered, and the only way in which the makers of similar devices for French cars can maintain their *amour propre* on the subject is by elaborating the design and workmanship of these elastic or compensating shackles, as they prefer to call them. The forms shown in Fig. 4 illustrate the point.

**AHEAD OF HIS TIME.**—How far a mental conception in mechanics may be in advance of the existing industrial facilities for executing it and of all commercial demand for it, while it is yet sound, or at least so plausible as to be sure to see the daylight of reality at some much later date, is illustrated in a French patent—No. 186,718, dated November 2, 1887—to a Mr. Furst.

In it all the main features of ultra-modern gasoline motors with revolving cylinders are illustrated, described and claimed as the exclusive property of the said Mr. Furst. He has three or more cylinders all working upon the same crankpin and in the same plane, though they may also be offset, if preferred. He gets a balanced motor by using an odd number of cylinders and firing them in the order 1, 3, 5, 2, 4, 1, etc. He provides electric ignition from a secondary coil and foresaw that the centrifugal

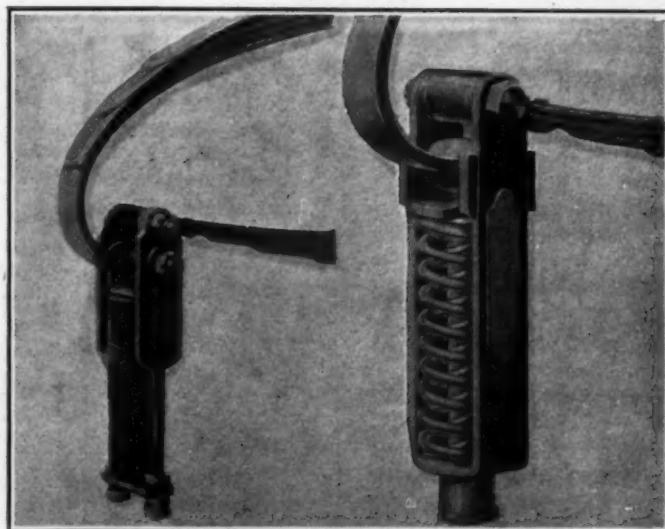


Fig. 3—Auxiliary springs in French clothes

action of the lubricating oil would make it necessary to provide for the automatic cleaning of sparkplugs at each explosion. He reserves the right to cool by flanges or by waterjacket and has the coming of aviation in mind, where he claims the virtues of his motor for "all sorts of locomotion" by reason of his suppression of "the heavy flywheel." The scope of his patent, which perhaps releases some disputed points in the construction of motors of this class to free competition, is indicated in the illustration, Fig. 3.—From *Omnia-Locomotion*, December 16.

**GAS METER.**—An old instrument for measuring a gas flow accurately depended upon a float in a slightly conical tube which the gas had to lift to pass, but the float would stick occasionally and the accuracy was lost. In a new apparatus the float is shaped as a top with oblique, turbine-acting notches in its upper edge. The gas causes it to rotate rapidly, by which action it is kept from contact with the tube wall. A scale on the side tells how many volume units of gas pass the float in a time unit. The measurement thus still requires constant observation, if the velocity of the gas flow varies, and comparison with a chronometer. The improved device, however, is said to be very useful for accurate dosing in anesthetic work by physicians and for measuring gas used with various tools.—From *Der Prakt. Maschinen-Konstrukteur*, October 12.

**AN EXPORT MARKET.**—Among the statistics of the year 1910 for the Straits Settlement of Malacca it is recorded that there are now 650 rubber plantations under cultivation in the vicinity of Singapore, which during the same period was the port of entry for \$400,000 worth of automobiles. Many motor wagons are used for the plantation work, but the best buyers are the rich Chinese, who control the capital of the country. They spend large sums for luxuriously equipped automobiles with a capacity for seating not less than six to eight persons, and most of them insist very strongly on having the accessories specially made to suit their individual tastes. This extends to lamps, spare tires, upholstery, paints and fenders. On the other hand, their indifference to horsepower is marked.—From *Allgemeine Automobil-Zeitung*, December 2.

# Automobile Metallurgy Made Easy

By E. F. LAKE

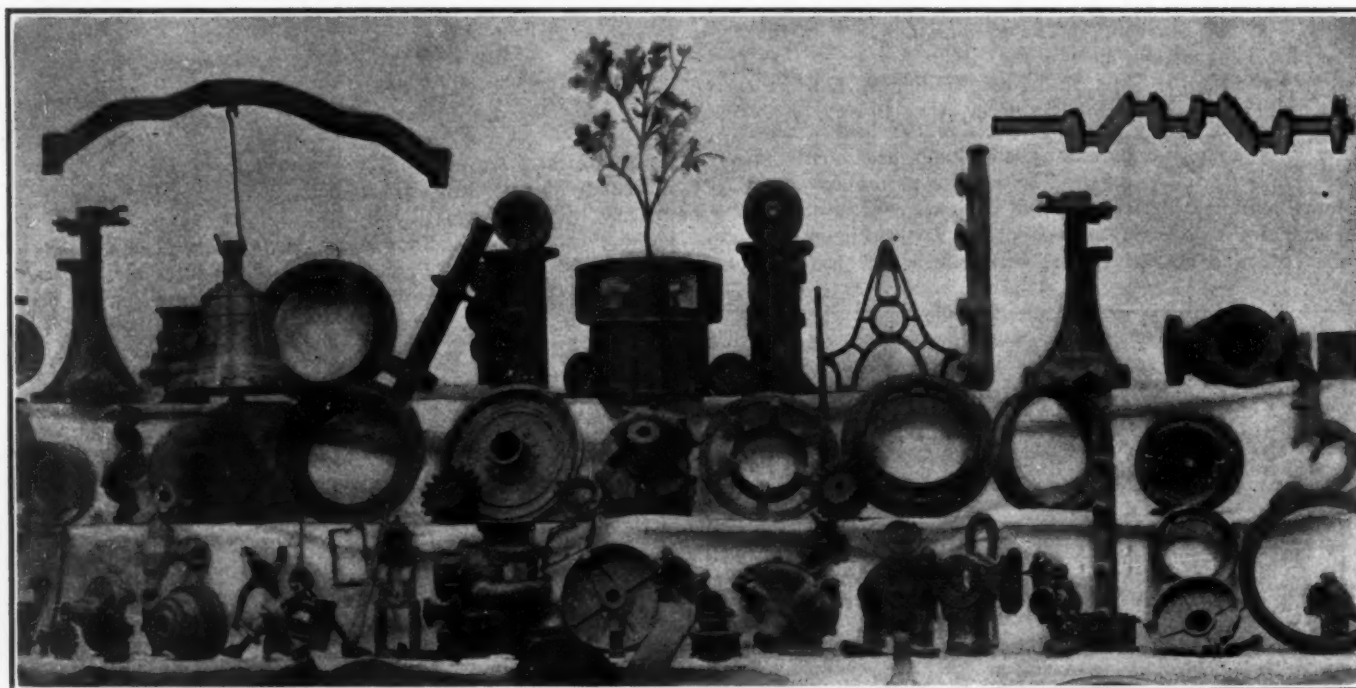


Fig. 1—Assortment of steel castings of various shapes and sizes

**C**ASTING STEEL consists of pouring the metal, when in a fluid state, into molds which give it the desired shape. Thus, when the steel that is made by the Bessemer, open-hearth, crucible or electric processes first leaves the furnace, it is poured into iron molds and cast. It is then cast steel. From here these ingots, as they are called, are usually taken to rolls and rolled down to the desired shapes. In the cast state, steel does not have as fine a grain, nor is its density as great as after it has been rolled, forged or hammered. In the cast state, however, steel is very useful for various automobile parts as it is the strongest metal from which castings are made.

While this is the same kind of steel that is in steel castings, the ingots are never used for making them, but the steels for castings are made in smaller furnaces in the foundry where the castings are made. These steels are usually made from steel scrap, iron ore and other materials in furnaces that differ but little from the steel-making furnaces described in former articles. Tropenas or Stoughton furnaces are used to a large extent in the steel foundries and these are very similar to the Bessemer converters. One difference is that instead of blowing air through the bottom of the furnace and then up through the molten metal, as in the Bessemer converter, the Tropenas and Stoughton furnaces cause a blast of air to be blown in the side of the furnace and over the top of the bath. Some other foundries use a furnace that is very similar to the open-hearth furnace, used for steel making. A few others make their steel in crucibles, and still fewer have installed electric furnaces for making steel for castings. This latter, while new, is fast growing

## Part X—Steel Castings

### Process of Making; Their Use in Automobiles; Tensile Strength, Elastic Limit and Other Qualifications

(NEXT WEEK—ROLLED STEEL)

in favor and in a short time, will, without doubt, supplant the crucible process. As in other steel-making processes, the highest grades of steels for castings are made in the electric furnace, the next best in the crucible, and the ordinary castings in open-hearth fur-

naces or converters by the processes already described.

Steel castings can be given intricate shapes that are impossible to make by rolling, forging, pressing or otherwise mechanically working. This is due to the fact that a pattern is usually made that is the exact size and shape of the casting desired. This is then placed in a box or frame and sand is rammed around it. This mold, as it is called, is parted and the pattern taken out, which thus leaves an impression in the sand that is the exact shape of the pattern. After the pattern is taken out, steel is poured into the sand mold and this forms the casting. An idea of some of the shapes that can be produced in this way can be obtained from Fig. 1, nearly all of the castings being for automobile parts of various kinds.

But a short time ago the ordinary carbon steels were the only ones that were made into steel castings. The improvements, however, have been so many and so rapid that it is possible to obtain steel castings of nearly any chemical composition desired, which includes nearly all of the special alloy steels. The different castings shown in Fig. 1 were made from stock that is soft enough to forge out and also weld by the ordinary methods, as is illustrated by the branch of leaves. Others are made from nickel steel, vanadium steel, manganese steel, chrome steel, and even from the nickel chrome steels, which are the most difficult of all to cast.



The carbon content of these castings varies from the low-carbon percentage of wrought iron, namely, from 0.08 to 0.10 per cent., up to a carbon percentage of 2.00 per cent., and they are made with any percentage between these two figures that is required. Castings can also be obtained with the manganese, silicon, sulphur and phosphorus in any percentage needed. The purifying and scavenging elements, such as titanium, vanadium, aluminum, etc., can easily be alloyed with casting steels before the castings are made.

While only a comparatively few years ago steel castings did not exceed 40,000 pounds per square inch in tensile strength, such castings are now difficult to find. Nearly any steel foundry will guarantee a tensile strength of 60,000 pounds per square inch for the soft steel castings, while the medium and hard carbon steel casting and the special alloys have a tensile strength that reaches 70,000 and 85,000 pounds per square inch. In some cases this has reached figures close to 100,000 pounds.

A large number of tests of ordinary carbon steel castings were made by the United States government on castings that were made for the navy, and the highest and lowest figures shown by these tests are given in the table, Fig. 2. The other tests gave various figures between these two. The strongest sample of the soft casting metal afterwards had vanadium added to it and other castings were made from this. This increased the tensile strength 8,000 pounds per square inch, the elastic limit over 11,000 pounds and the metal then withstood over three times as many alternating vibrations. The figures for this are given directly under those of the soft or low-carbon steel samples.

Nickel-steel castings can be made to equal the tensile strength of the best carbon steel castings. They will then be as hard but not so brittle as these, as nickel adds ductility and toughness to the metal. It raises the elastic limit up closer to the tensile strength and reaches figures that are considerably higher than can be obtained with test bars of the carbon steels. The reduction of area is also made higher. Engine crankshafts and front axles of I-beam section have been cast from this steel and gave good satisfaction in use. To attain the required strength they had to be given more sectional area than forgings and consequently are not so efficient as the forgings that are usually

used. The strength of nickel steel castings nearly always varies between the figures given in the table.

What is called direct steel castings are made by taking the molten steel directly from a steel-making furnace to a mixer. Here it is heated while the chemical properties are being adjusted and afterwards poured into castings. Such castings can be obtained with a guaranteed strength of the figures given in the table.

What are called manganese steel castings have a chemical composition similar to the ordinary carbon steel casting except that the manganese is raised from around .70 per cent. to from 10 to 15 per cent. These are so tough they cannot be machined with any of the steel tools, while they entirely lack the brittle hardness of other steel castings that cannot be machined. This is a peculiar property that cannot be found by adding any of the other elements to steel. Manganese steel castings are so tough it is next to impossible to break them, even when cast in comparatively thin sections.

Many parts of an automobile are made from steel castings and some use much more than others. The differential gear-case is nearly always made from a steel casting and in most cases this case is made large enough to enclose the bevel, drive gears with the differential gears. The change-speed gearbox is quite often made from cast steel, as well as the steering-gear case. Casting is an easy way of making the change-gear levers, step brackets, gear blanks, brake drums and other brake parts, the exhaust and intake manifolds, piston connecting rods and other parts of like nature, and hence these are often made from steel castings.

Thus it will be seen that steel castings are important factors in the construction of automobiles. When care is

used to see that such castings are made from the proper materials, that they do not contain blowholes and that they have high mechanical properties, such as tensile strength, torsion, resistance to vibrations, etc., they can be used without any fear of failure. Many steels are made, however, that are full of blowholes, weak, and generally of a poor quality. It is necessary, therefore, to use care in the selection of such materials before putting them into parts where breakage might mean a serious accident or at least a holdup on a country road, far from a garage.

TABLE OF MECHANICAL PROPERTIES OF STEEL CASTINGS.

Kind of Steel	TENSILE STRENGTH	ELASTIC LIMIT	ELONGATION IN 2 INCHES	REDUCTION OF AREA	Resistance to Alternating Vibrations
	Pounds per Sq. In.	Pounds per Sq. In.	Per Cent.	Per Cent.	
Low carbon or soft	64,400	31,300	29	36.3	4,706 14,971
with vanadium added	69,200 77,200	35,200 46,800	34 20	41.9	
Medium carbon.....	70,500 75,000	36,000 37,000	32 27	47.8 35.7	
High carbon or Hard.....	85,000 88,000	45,000 45,800	22 15	32.7 20.6	Remarks from to guaranteed
Nickel.....	78,000 88,000	50,000 58,000	25 30	40. 48	
Direct.....	70,000	35,000	25	40	
Manganese.....	140,000	55,000	45	.....	

## World Struggle in Machine Production

England, Germany and the United States divide the world's export trade in machinery, leaving only 20 per cent. to all other countries. England is still ahead with a total of 142 million dollars' worth for 1910, as against 139 million dollars for Germany and 111 millions for the United States, but England has gained only 6 1-2 per cent. from 1910 to 1911, while Germany has gained 16 per cent. and the United States 21 per cent. Under the classifications comprising motors, electric equipment, mining machinery and pumps, the United States has to its credit 34 1-2 million dollars, England 35 millions and Germany 30 millions, and under metal-working machinery and machine tools Germany is listed with 14 million dollars, the United States with nearly 10 millions and England with 3 1-2 millions—all for 1910. France imported in the same year 50 million dollars' worth of machinery, out of which Germany secured 13 million dollars, England 9 millions and the United States 6 millions, the rest scattered.—*Eco des Mines et de la Métallurgie.*

## Public Tests of Materials

Many of the tests of materials carried out during 1911 at the Public Test Station of Germany dealt with materials used in the automobile industry. Experiments to determine the durability of different rubber compositions in tires, the apparatuses for which were exhibited at the London rubber show and attracted wide attention, are still being continued. Three samples of automobile steel which had been submitted for test of their toughness and ability to withstand shock gave 6.1, 12.9 and 11.1 kilogram-meters per square centimeter as ultimate strength under the notched-bar test, showing a wide variation for steels intended for similar work. No definite results could be reached with regard to the tendencies of various lubricating oils to produce carbonaceous deposits in motors, but the opinion is expressed that oils containing portions which are soluble in acetone and of relatively high density are subject to suspicion.—*From Zeitschrift des Mitteleuropäischen Motorwagen Vereins, ultimo December.*

# Letters Answered and Discussed

## Information on Valve Timing, Carbureter Troubles, Engine Knocks and Starting

### Wants Timing Information

EDITOR THE AUTOMOBILE:

[2,997]—In your recent illustrated valve timing diagrams, where the notation "valve opens" is used is it intended to mean that the valve is just starting to open? The same question applying to the notation "valve closes."

The diagrams show the intake valves opening and exhaust valves closing several degrees past top dead center.

Might I ask the particular benefit derived from this combination, and why would it not be well to have these valves operate at exact top dead center?

Also, why is it that manufacturers all insist on opening the exhaust 40 deg. to 45 deg. before bottom center is reached? There seems to be considerable effective power left at this portion of the stroke and I fail to see any good reason for such early opening.

A. E. WELLS.

New York City.

In the timing diagram to which you refer the designation of the different actions of the valves such as "inlet closes" or "exhaust opens" signifies the beginning of the operation in all cases. The reason for the early opening of the exhaust valve is that the pressure should fall to atmospheric in the cylinder before the piston starts on the upstroke. It must be remembered that the last 40 degrees on the crank circle are a very small part of the stroke and hence little power is lost. This may be readily perceived if a diagram were laid out in which the piston travel were shown during the last 45 degrees of the crank throw. The reason given generally for the advantage which has been found in closing the exhaust valve as late as possible is that better scavenging effect is had. A partial vacuum is created in the combustion space if the inlet valve does not open until after the exhaust is closed. In some methods of timing the reverse is true. That is, the inlet opens before the exhaust is closed so as to help sweep out the dead gas.

### Is Electric Lighting Reliable?

EDITOR THE AUTOMOBILE:

[2,998]—I—Has the electric lighting of automobile by dynamos been tested out sufficiently to insure a buyer satisfaction?

2—If the car is of a type for which special space for the dynamo has not been provided, can a dynamo lighting system be used?

New York City.

D. J. B.

1—It would seem that since so many motor cars have adopted lighting systems as standard equipment, and some well-known electrical companies of high standing guarantee their systems, that satisfaction is assured.

2—This matter must be decided by the reputable electric companies who know best how their apparatus should be mounted and driven. We know of many mounted on old cars, of old makes and models.

### Running Without a Flywheel

EDITOR THE AUTOMOBILE:

[2,999]—To settle a bet, would you kindly tell me if a four cylinder, four cycle engine will run without a flywheel?

Hicksville, N. Y.

LONG ISLAND.

It will not if it is built for a flywheel. Counterweights could be used on the cranks which would perform the same office.

### Inserting Priming Cups

EDITOR THE AUTOMOBILE:

[3,000]—I would like to know through THE AUTOMOBILE:

1—If tapping the cylinder head, on the Ford car, direct over the piston head, will be all right for inserting priming cups, or would it be better to get a primer I see advertised that is screwed into the spark plug hole and the spark plug screwed into that? Which will be the best?

2—Why is my Ford car hard to start after it has stood over night? It is also that way in the summer time; the carbureter is set to almost overflowing now.

3—Can I remagnetize the Ford 36 magneto with dry batteries instead of storage battery by using a number of them?

4—Does it weaken the magneto to take the current from it for the headlights?

Woodlawn, Mo.

L. D. SANDERS.

1—It would be cheaper and much more satisfactory to purchase one of the plugs which are sold combining a plug and priming cup into one piece, as shown in Fig. 1.

2—Do not put all the blame on your carbureter and set it for too rich a mixture or you will soon be in the throes of carbon trouble. The priming cups will probably end your trouble when you put them in.

3—The only good method to pursue is by storage battery. It would take a very large number of dry batteries, at least 36, to magnetize the magnets to any extent and then the magnets would be weak and the batteries entirely used up.

4—Yes; it does to some extent, thus necessitating a greater frequency of remagnetization.

### A Variety of Questions

EDITOR THE AUTOMOBILE:

[3,001]—Will you kindly inform me through THE AUTOMOBILE as to the following questions:

1—Does alcohol and water stay mixed after standing a length of time, say about 12 hours?

2—Which is the lighter, alcohol or water?

3—I wish to color my lamps (brass) black and do not know what to use. Will you please tell me what is best?

4—I let my car stand in the barn (barn not heated) five days in zero weather and when I went to crank it, it turned over very hard and I had considerable trouble in starting it. Will you please tell me the cause of this? The water was not frozen.

5—My car runs without a misfire when I am going 10 miles per hour, but when I go faster than that, it starts missing. Will you please tell me the cause of this?

6—I have a four-cylinder, 20-horsepower, five-passenger touring car and get on an average 10 miles to the gallon of gasoline. Should I get better mileage per gallon? I use the best gasoline obtainable.

7—My speedometer registers 2,578.7 miles and I haven't had a puncture. Should I take my casings off and put fresh powder in them or let well enough alone?

J. N. C.

Chicago, Ill.

1—Alcohol when once mixed with water will stay so.

2—.94 volumetric alcohol is .82 times as heavy as water.

3—See page 193, issue of January 11.

4—This is what would happen to nearly any automobile on account of the oil congealing in all the bearings and the difficulty in vaporizing the cold gasoline.



5—There are four causes which would produce these results, namely worn timer, weak battery, fuel does not flow freely (examine air vent), faulty vibrator adjustment, faulty carbureter adjustment. The remedy is obvious in each case except the latter in which case it is necessary to slightly increase the gasoline feed.

6—You should get better. Do not run on retarded spark or use a rich mixture at high speeds.

7—Let the tires alone if the casings are in good condition.

### Has Carbureter Trouble

Editor THE AUTOMOBILE:

[3,002]—I—I am the owner of a 30-horsepower runabout and find that the only trouble I have is with the carbureter, which puffs when mounting a hill and when first starting. I have taken the instrument apart, but find no trouble. I have also cleaned the fuel pipes and the gasoline tank and am always careful to allow the gasoline to run through a piece of chamois when filling the tank. I would like to know the trouble.

2—How can I determine if there is a short circuit in the wires and locate the same?

3—How often must the valves in any car be ground and why should this have to be done at all?

New York City.

C. R.

1—It is evident that the mixture supplied is too weak in starting and in hill climbing. Examine the air-vent hole in the gasoline tank and see if it is free and open. If this is not the case it should be opened so that the gasoline will flow freely. Examine the gasoline tubing to determine if it has no vertical bends or is not too small. If you find that the vent hole in the tank is open it would be a good plan to tighten the auxiliary air valve spring as in Fig. 2 if your carbureter has one, as this should never open on low speeds.

2—If you have a short circuit in the wiring the spark at one or all of your cylinders will be affected, so that there will be no spark at all in these cylinders. A short circuit is generally shown at night by running the car in darkness and watching for a spark at some point in the circuit.

3—As soon as they become worn. When they become so there is a loss of compression. There is no stated interval between times for grinding.

### Compression Is Limited

Editor THE AUTOMOBILE:

[3,003]—Please let me know through THE AUTOMOBILE which would be the more powerful, an engine having a small compression space or one so constructed that the compression space would be large. Which would give the best results and why?

C. H. Goss.

St. Johnsbury, Vt.

There are limits to compression which are fixed by the fact

that preignition is caused by the gas being compressed to such a point that the heat of compression is high enough to ignite it. A compression of 75 pounds to the square inch is about as high as desirable with gasoline. It has been found that better all-around results are given when the gas is compressed to about 70 pounds to the square inch. The reason for this is the fact that the maximum pressures of explosion are then not excessive, while a powerful motor is secured without the necessity of making the castings excessively heavy.

### Has Knock With Open Throttle

Editor THE AUTOMOBILE:

[3,004]—I am having great trouble with my motor, not being able to open the throttle without getting a pronounced knock, even with the spark considerably retarded. When I have the throttle very slightly opened I can advance the spark to the limit without getting any knock at all. The magneto gears have been taken out once. There is no carbon in the cylinders. Would you kindly tell me through the columns of THE AUTOMOBILE what the trouble is.

N. H. HARRIMAN.

Macon, Miss.

Examine the connecting-rod bearing caps and you will probably notice that there is a certain amount of play there which should be taken up. If this is not the case, examine the other bearings for wear. There is a slight possibility that the motor has too great a compression; if so a repairman will be necessary, as the case will have to be dealt with carefully.

### Starting Car When Cold

Editor THE AUTOMOBILE:

[3,005]—Having read your "Little Bits of Motor Wisdom" and profited thereby, I thought I would suggest the following device for starting a cold motor without much cranking.

Procure a friction top can of about 1 pint capacity and make a circular opening with a can-opener in the cover. Insert a piece of rubber tube about 1 foot in length into this. A gill of water is placed in the can with a lump of calcium carbide the size of a butternut. Close the can quickly and place the free end of the pipe into the air intake of the carbureter as in Fig. 3 and crank in the usual manner.

I have recently started a 5 by 6-inch motor which stood in a shed all night at a temperature of 8 degrees below zero. The owner of the car claimed that I would have to use hot water and various other devices, but none was needed.

That this device has met with success under such stringent circumstances as those mentioned would certainly seem to recommend it. The opinion of other readers on this scheme and also their experiences with it if tried are cordially invited.

Troy, N. Y.

R. J. P.

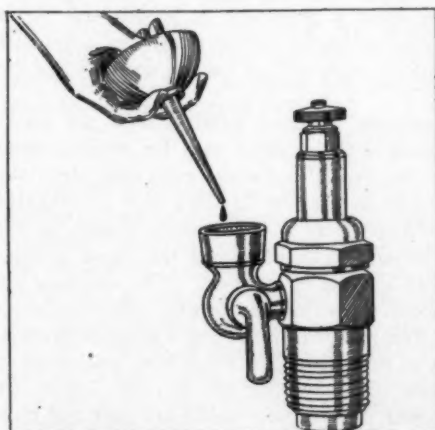


Fig. 1—Spark-plug with priming cup

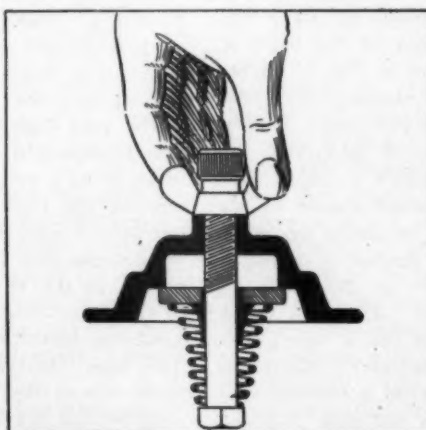


Fig. 2—Adjusting for auxiliary air

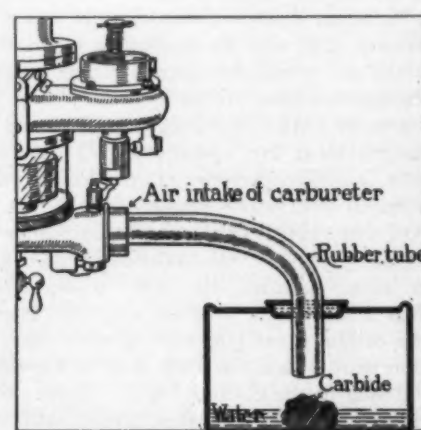


Fig. 3—Suggested for easy starting

# Pointers for Repairmen and Drivers

## Remedying Blowholes; Oxy-Acetylene Welding; General Upkeep

**BLOWHOLES IN IRON CASTINGS**—There are many uses to which cast iron is put, but none of greater importance than the manufacture of engine cylinders. In the gas engine soft gray iron is generally used for this purpose and gives the best results. Several attempts have been made to use steel, but all have met with at least a partial failure, and the added expense and difficulties of working have not at all been justified. There are certain difficulties which are encountered in making castings which have not been quite overcome and one of these is the occurrence of blowholes. These are prone to occur in spite of the many improvements made in the manufacture of cast iron. A certain percentage of cylinder castings are rejected owing to the detection of flaws in the metal, but there are others which escape even the great vigilance of the inspectors employed by every foundry engaged in the manufacture of castings.

It is to the flaws which escape the supervision of the makers that our attention is turned for the moment. The principal cause of the blowhole is an air bubble in the molten metal. When the iron hardens the bubble remains in the metal and

A very much neater-looking job is made if the projection of the plug be removed. There are two ways of doing this, one being with a cold chisel and mallet, the other with a hack saw, as in Fig. 5. The latter is the better way, as there is no chance of breaking down the metal on the sides of the plug, as there is in the case of the heavy pounding with the mallet. A type of plug which is often inserted has a hollow top. It is made with a place for a face wrench to be inserted instead of with a projection.

**OXY-ACETYLENE WELDING**—In connection with blowholes in castings it may be said that, while the foregoing home-made repair is very satisfactory, the best method to use if the owner of the car wishes to have the cylinder as strong and good as new is to have the part welded by the oxy-acetylene process. This method of welding stands supreme for automobile work and is especially successful for aluminum crankcases.

This method of welding is by no means one within the scope of the amateur repairman, as it takes a great amount of ex-

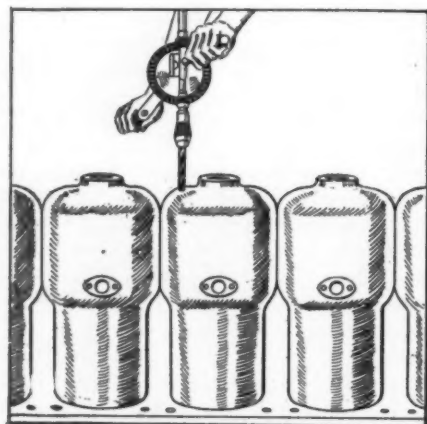


Fig. 1—Drilling through blow-hole

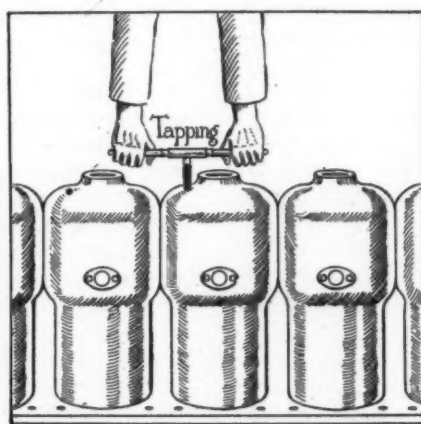


Fig. 2—Tapping drilled hole



Fig. 3—Applying red lead

the result is a blowhole. If the bubble is small and in the center of the metal it will sometimes escape the tester's hammer and the defective piece will pass into the hands of the unsuspecting purchaser. Should such an accident occur there is a very simple and effective way of going about remedying the difficulty.

A breast drill is procured if it is not possible to use a stationary drill and the casting is bored through at the point at which the bubble has been detected, as shown in Fig. 1. After the hole has been drilled sufficiently large to remove all the metal about the defect, a reamer is secured and the hole made smooth. During these two operations great care must be taken that the hole is drilled concentrically. This is especially the case with a breast drill. The reamer will correct a small degree of eccentricity, but there is always the chance of removing too much metal. After the hole has been drilled and reamed it is tapped to some standard size with a tap wrench as illustrated in Fig. 2, at which a plug may be inserted. The plug is of the ordinary gas pipe type in most cases and has a raised portion upon which a wrench may fit for the purpose of tightening the plug in the casting, Fig. 4. Before the plug is inserted into the tapped hole it is first dipped into thick red lead in order that the joint be made as tight as possible, Fig. 3.

perience to manipulate the burners and to regulate the supply of oxygen and gas correctly. Welding by the oxy-acetylene process requires three principal pieces of apparatus—a burner to manipulate the flame, a storage tank for oxygen and a storage tank for the acetylene. It is sometimes the case that instead of storage tanks being used a generator is substituted. This is especially the case with acetylene, which is readily generated, there being many forms of generator in use on automobiles for lighting purposes.

The very high temperature which is possible with the acetylene process and the ease with which it may be carried about make it very valuable for repair purposes, especially since the cost of the repairs made by its use is very low. A skilled operator is required, however, and it is not wise to stint money in securing one who knows his business, as the flame is dangerous in the hands of a bungler or tyro. The temperature of the flame ranges about 3,500 deg. centigrade, which is about 1,000 deg. higher than that reached by the oxy-hydrogen process. This high temperature at first dismayed those who attempted to make use of the process, but now that the burners which are used with it are improved it is rapidly being adopted for general use.



**WHEN TO ADJUST BRAKES**—When the brakes do not hold the car as well as they did when the car was new the time has come to make an adjustment. The points at which this adjustment can be made vary upon cars of different make. It is usually made on the turnbuckle which will be found on the rods that run back to the brakes from the pedal. In other cars the turnbuckles have been superseded by a wing nut adjustment which is held by a spring. In the latter case the change of adjustment due to vibration is very slight, as the tension of the spring will hold the nut tight under considerable stress. On the turnbuckle, too, there is often a means of locking it against vibration. If this is the case the locking device should be loosened and the rods adjusted as they may need. Too tight an adjustment of the brakes is as bad as having them too loose, as in the former case there is a marked tendency on their part to drag, in spite of the springs placed in the mechanism to prevent this.

When the brakes drag it will seem as if there is a great weight upon the car and the motor will not seem to be developing full power. In case the brakes drag on both drums at the same time, while the adjustment on the rods seems correct, a change will have to be made within the drum. If the operator is not of a mechanical turn of mind this had better be done by a repairman, who will perform the work very quickly and at small cost. If, however, the operator of the car desires to make the adjustment himself, he will find that on opening the drum there is a nut which regulates the tension on the drag-spring. This can be tightened and the brake will be kept clear of the drum. Before reassembling the brake the pedal should be tried in order to determine if the rod adjustment on the turnbuckle

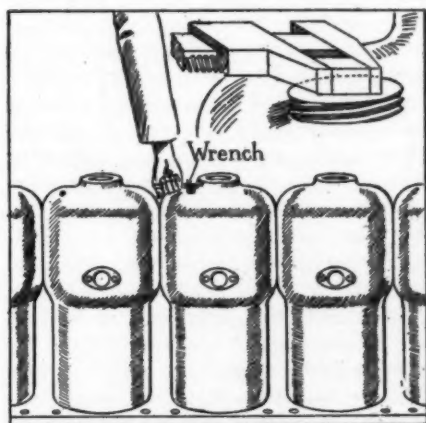


Fig. 4—Fitting plug in cylinders

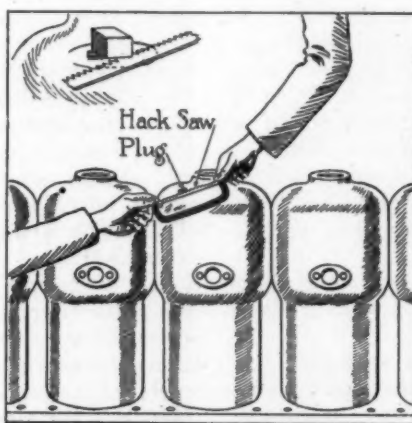


Fig. 5—Cutting off plug top

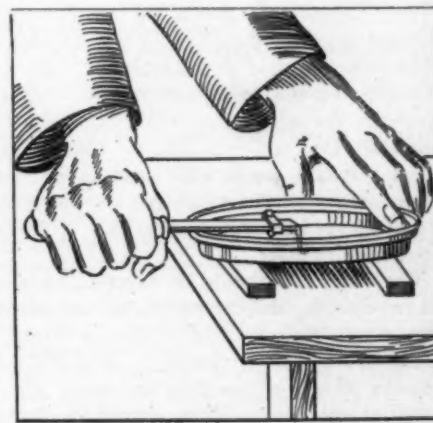


Fig. 6—Using best form of circular cutter

is still satisfactory after the internal adjustment has been made. These two adjustments should be counterbalanced so that the brakes will not drag though a comparatively short throw of the pedal will bring them into engagement.

Oil should be kept from the brakes and drums as much as possible, for if it leaks to these points it will not only prevent their holding, but will spoil the facing of the shoes. The fabric-faced brakes do not require lubrication, while those in which the braking surfaces are metal-to-metal require more than an occasional drop of oil.

**CARE IN USING HOSE**—The highly polished body of a new car always brings more or less joy and pride to the owner and is on many occasions the inspiration of good resolutions so far as the maintenance of this bright finish is concerned. A little knowledge is a dangerous thing in this connection, as it is in a good many others, inasmuch as the right recipe may be known, but the method of application is often a point which is not so well taken cognizance of by the user of the car.

When a car returns from a journey that has been accomplished in the rain over country roads it will always be more or

less spattered by the mud, even if the rainfall be slight. This mud should be immediately removed by the application of cool water. The water may be thrown on the body with a pail, or, as is more generally done, with a hose. The secret of the process lies in the manner of application of the water with the hose. Many persons make the mistake of turning a fine stream of water with great force against the side of the body and take the mud off the side of the vehicle by a sort of hydraulic mining process, which is, to say the least, very effective. In fact, it is so effective that it not only removes the little spots of mud, but takes the finish along with it. The secret is to play the stream gently on the mud, thus softening it and causing it to flow from the body without disturbing the delicate finish below it.

It is a great mistake to allow the mud to dry on the vehicle, as when it hardens it adheres very strongly to the varnish. The result of this is that when the mud is removed the finish comes with it.

**CUTTING CIRCULAR HOLES IN SHEET METAL**—This has very often to be done in the garage and it is often the case that the amateur repairman makes use of the can opener. When this is done it may be a good thing to know that there are two forms of this instrument. The general type which has been in use for a long time will cut a rough-edged hole which is not often desirable for many reasons. The form shown in Fig. 6 has a central pivot which is passed through the metal and a cutter inserted by turning down the opener. The hole is cut by a single rotary motion of the instrument and is of regular shape

without the jagged edges which are generally made by the common form of can-opener. It is a matter of common sense to put two pieces of wood under the piece of sheet metal so that the surface of the table, or whatever the operation is done upon, will not be injured on account of the blade of the cutter passing through the metal and into it.

**CARING FOR ELECTRIC VIBRATOR HORNS**—It will sometimes happen that the adjusting screw on the vibrator horn will work loose in much the same manner as the screw on a bell buzzer. When this happens the rapidity of vibration is decreased and hence the volume of sound will suffer. When this becomes noticeable it is a very simple matter to remove the cover from the vibrator box of the horn and tighten up the vibrator screw, which will be found very easy to get at in any of the modern horns upon the market. Another thing which will often happen in connection with a rough tour is that mud will be tossed into the horn and often will go so far as to lodge on the diaphragm of the horn. This may be readily removed by taking out the projector and cleaning out whatever has made its way into the interior of the instrument.

# The Ideal Automobile for 1913

Some of Our Readers' Conceptions of What Next Year's Car Should Be

## An All-Around Car

EDITOR THE AUTOMOBILE:

Having noticed that you are to continue your interesting conceptions of ideal cars, I should like to offer a few suggestions on the ideal machine for 1913.

The engine should have four cylinders, 4 3-4 inches by 5 1-2 inches, cast in pairs and of the T-head type. A three-bearing crankshaft offers sufficient strength for all conditions of service and facilitates repairs and adjustments to the shaft. The valves should be interchangeable and the valve spring should be incased to lessen noise and keep out dust. Bosch magneto with double distributor and two sets of spark-plugs should be used. The firing should be so arranged that either set of plugs can be fired individually or both simultaneously. A Schebler carbureter with air intake heated by the exhaust pipe should be used. There should also be an auxiliary air valve for use when racing or climbing hills.

The clutch should be of the multiple-disk type, running in oil. A four-speed transmission, with direct drive on the third speed, ratio 3.3 to 1, should be used. There should be a tire pump located on the gearcase.

The front axle should be of I-beam construction with a Timken rear system, all wheel bearings being of the annular type. Both brakes should be on the rear hubs, the service brake being external and the emergency internal. More attention should be given to the arrangement of the front seats; they should be relatively low and well tilted. The steering column should be given a rakish angle, which adds greatly to the comfort of the driver on long runs. The gas and spark levers should be above the steering wheel on a quadrant, friction pins being used to hold them in place.

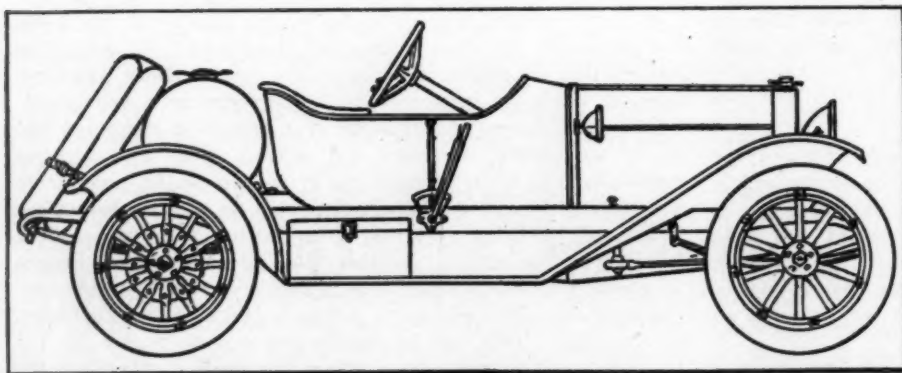
The headlights should be electric, the side and tail lights either oil or electric, the current being furnished by a Gray & Davis system in connection with a storage battery.

The front springs should be semi-elliptic and a platform suspension should be used in the rear. The frame should be in-swept at the front. Tires should be 36 inches by 4 1-2 inches, preferably quick detachable, and two extra being carried for touring. The body should be a straight line design, and there should be no boxes on the running boards.

This car should be of moderate weight, and it should possess power in reserve for all weather conditions. It should be an ideal all-around car for touring, urban or suburban use. In my opinion, it could be marketed for \$3,000 at a profit.

Knoxville, Tenn.

J. E. H.



A Poughkeepsie's Ideal

## Two-Passenger Ideal

Editor THE AUTOMOBILE:

My ideal car is as follows: The body would be a two-passenger one, similar to the cut herewith. A pressed steel frame would be used, and the motor would be a T-head, four-cylinder type. The cylinders would be cast in pairs, with a bore of 4 5-8 inches and a stroke of 6 inches. Automatic force-feed oiling to the three main bearings and through the hollow crankshaft to the connecting-rod and piston pins would be used. The throw off from the connecting-rod would lubricate the cylinders, camshaft, etc. There would be no splash lubrication. Oil would fall to the reservoir, where it would be filtered and re-pumped. There would also be a pressure gauge on the dash.

The ignition would be by high-tension magneto, combined with a synchronized battery system. Double ignition would be used, both spark-plugs firing simultaneously if desired. The transmission would be selective with three speeds forward and reverse. Four speeds are an added complication of little value except on the heaviest types of cars. The clutch would be of the multiple-disk type, with steel plates running in oil. The drive would be by a straight line shaft.

The rear axle would be floating, of pressed steel, the transmission and differential gears being removable through the rear. The front axle would be a forged I-section. Two internal brakes, 16 inches in diameter with 2-inch faces, would be placed on each rear wheel. They would be fabric-faced. Wing-nut adjusters, accessibly located, would be placed on the brake rods. Breaking strains would be taken by the drive rods from the rear axle to the frame, similar to the Locomobile construction.

The wheelbase would be 120 inches, the tread 56 inches, wheels 36 inches and tires 36 by 4 1-2 inches on demountable rims. A worm and gear construction, liberally proportioned, would be used on the steering mechanism. The gasoline would be fed by gravity from a 30-gallon tank. The front springs would be semi-elliptic, and the rear ones would be long semi-elliptics of the Mercedes type. A cellular radiator mounted on trunnions would be used. The finish would be optional, and the upholstery black leather. Deep seats of black leather, the product of careful workmanship and tilted back, would be added. The weight of the car would be about 2,600 pounds.

The equipment would consist of an electric lighting system, air or electric starting system, horn, tools, top, tire irons and chains and shock absorbers.

The valve mechanism would be inclosed by cover plates. The fan would be shaft-driven. The motor bearings would be plain, while ball bearings would be used throughout the rest of the car where feasible. Conical roller bearings would be used in the front wheels. The connecting-rod caps would be held by four bolts. A barrel crankcase similar to the Marmon and three-point suspension would be included and there would be a reserve oil tank with a capacity of 2 or 3 gallons located in a convenient place. There would be a clutch brake to prevent the gears from clashing. The drive-shaft would be inclosed in a torsion tube, the drive being taken by the drive rods.

Poughkeepsie, N. Y. C. Y. B., Jr.



## Harking Back a Decade

### Extracts from the Automobile Papers of Ten Years Ago

FROM *The Motor Review*, January 23, 1902:

Charles E. Duryea in a communication says: "The question of a national organization of motor vehicle users for the general good has reached a point that indicates a goodly interest in the matter and the time seems ripe now to push forward again the oldest organization of its kind in the country, the American Motor League, organized in Chicago, in 1895."

Consul G. W. Roosevelt at Brussels reports that a vast amount of interest in mechanical traction has been stirred up in Belgium by the prospects of the two automobile shows that will be held in Brussels in the spring.

The Geneva Automobile & Manufacturing Company has elected J. A. Carter president at its recent annual meeting at Geneva, O. Mr. Carter is described as a retired capitalist of unlimited means. Fayette Brown, head of a machinery-making company, of Cleveland, has been named vice-president.

The Kokomo Rubber Company, of Kokomo, Ind., has secured a license to manufacture tires under the Tillinghast patent covering single-tube tires.

The Akron Gear Company has purchased the plant and business of the Holman Gear Company and will consolidate the plants at Akron. This will add 100 men to the payroll, and will make the city of Akron the greatest gear-producing point in the country.

The first installment of the Indianapolis Transfer Company's new automobile cabs has arrived. Eight vehicles are included in this batch. The cars are made by the Woods Electric Motor Vehicle Company in Chicago and weigh 5,200 pounds.

At the local Spalding store in Chicago it is still uncertain whether a line of automobiles will be handled this season. The Knox was sold here last year and a good business was done, but the floor space is so limited that this part of the enterprise may be abandoned.

Present indications point to a wonderful show in Chicago in March. The exhibits contracted for to date include twenty-two gasoline carriages, ten steam carriages and eight electrics.

Exports of motor vehicles and parts for the past week amountd to \$10,500.

The sporting program of the Automobile Club of America has been outlined. There will be a reliability run of the non-stop variety. Stoppage of the motor for any reason will bring disqualification. There will be a race meeting near New York, May 30-31.

The Long Island Automobile Club is planning an endurance run for April 20.

The suggested affiliation of the Long Island Automobile Club and other automobile clubs in opposition to the plan of the Automobile Club of America for a national organization is still brewing but nothing like an open break has been made so far.

The new automobile law introduced in Rhode Island calls for a speed limit of 15 miles an hour. A fine of not more than \$200 may be imposed for breach of the speed limit.

Almost any maker can easily construct his original body so that a specially built inclosed top, with one or two side doors, can be fitted to it without alteration by the placing and adjustment of a few screws. For winter touring practically all operating levers on the outside may be readily removed to the inside of the body and retained in substantially the same relation to the power plant and running gear.

State Senator Cocks, of Long Island, father of the bill to cut down speed on the highways, has arranged for a hearing of his bill before the Senate Committee on Codes for January 22.

## Calendar of Events

### What the Coming Months Have in Store for the Automobilist

#### Shows

- Jan. 13-27..... Philadelphia, Annual Show, First and Third Regiment Armories, Philadelphia Automobile Trade Association.
- Jan. 22-27..... Rochester, N. Y., Annual Show, State Armory, Rochester Automobile Dealers' Association.
- Jan. 22-27..... Detroit, Mich., Wayne Gardens. Eleventh Annual Show, Detroit Automobile Dealers' Association.
- Jan. 22-27..... Providence, R. I., Providence State Armory, Rhode Island Licensed Automobile Dealers' Association, Automobile and Accessories Show.
- Jan. 27-Feb. 10..... Chicago Coliseum, Eleventh Annual Automobile Show, under the auspices of the National Association of Automobile Manufacturers. Pleasure cars, first week. Commercial vehicles, second week.
- Jan. 27-Feb. 10..... Pittsburgh, Pa., Sixth Annual Show, Automobile Dealers' Association of Pittsburgh, Inc. Pleasure cars first week. Commercial vehicles, second week.
- Jan. 29-Feb. 3..... Scranton, Pa., 13th Regiment Armory, Second Annual Show.
- Feb. 3-10..... Montreal, Canada, National Show, Drill Hall, Automobile Club of Canada.
- Feb. 3-10..... Harrisburg, Pa., Third Annual Show, Arena.
- Feb. 5-10..... Buffalo, N. Y., Convention Hall, George C. Fehrman.
- Feb. 5-17..... St. Louis, Mo., Coliseum, Annual Show, Pleasure cars, first week. Commercial vehicles, second week.
- Feb. 10-17..... Atlanta, Ga., Auditorium-Armory, Atlanta Automobile and Accessory Dealers' Association.
- Feb. 12-17..... Ottawa, Ont., Howick Hall, Annual Show, Ottawa Valley Motor Car Association.
- Feb. 12-17..... Kansas City, Mo., Annual Show, Combined Association of Motor Car Dealers.
- Feb. 12-17..... Troy, N. Y., Second Annual Show, State Armory, Troy Automobile Dealers.
- Feb. 12-19..... Dayton, O., Third Annual Show, Dayton Automobile Club.
- Feb. 14-17..... Grand Rapids, Mich., Third Annual Show.
- Feb. 17-24..... Pittsburgh, Pa., Second Annual Show, Exposition Bldg., Pittsburgh Auto Show Association, Inc.
- Feb. 17-24..... Newark, N. J., Fifth Annual Automobile Show, New Jersey Automobile Exhibition Company, First Regiment Armory.
- Feb. 17-24..... Minneapolis, Minn., National Guard Armory and Coliseum, Annual Automobile Show, Minneapolis Automobile Show Association.
- Feb. 19-24..... Omaha, Neb., Seventh Annual Show, Auditorium, Omaha Automobile Show Association.
- Feb. 19-24..... Hartford, Conn., Annual Show, Automobile Club of Hartford, State Armory.
- Feb. 19-26..... Cincinnati, O., Annual Show, Music Hall, Cincinnati Automobile Dealers' Association.
- Feb. 20-24..... Binghamton, N. Y., State Armory, Third Annual Show, Automobile Dealers' Association.
- Feb. 20-28..... Baltimore, Md., Annual Show, Baltimore Automobile Dealers' Association.
- Feb. 21-28..... Toronto, Ont., Annual Show, St. Lawrence Arena, Canadian National Automobile Association.
- Feb. 24-March 2.... Brooklyn, N. Y., Twenty-third Regiment Armory, Annual Show, Brooklyn Motor Vehicle Dealers' Association.
- Feb. 26-Mar. 2..... Elmira, N. Y., Second Annual Show, Elmira Automobile Club.
- Feb. 26-Mar. 2..... Paterson, N. J., Annual Show, Fifth Regiment Armory, Paterson Automobile Trade Association.
- Feb. 26-Mar. 3..... Quincy, Ill., Highland Park Stone Pavilion, Annual Mississippi Valley Show, Quincy Auto Club.
- Feb. 28-Mar. 2..... Davenport, Iowa, Annual Show, Davenport Automobile Association.
- March 2-9..... Boston, Mass., Tenth Annual Show, Boston Automobile Dealers' Association, Inc.
- March 12-16..... Denver, Col., Auditorium, Annual Show, Motor Field, G. A. Wahlgreen, Manager.
- March 6-9..... Louisville, Ky., Fifth Annual Show, First Regiment Armory, Louisville Automobile Dealers' Association.
- March 6-9..... Tiffin, O., Second Annual Show, The Advertiser.
- March 12-16..... Syracuse, N. Y., Fourth Annual Show, State Armory, Syracuse Automobile Dealers' Association.
- Race Meets, Runs, Hill Climbs, Etc.
- April 27..... Philadelphia, Annual Roadability Run, Quaker City Motor Club.



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## The West's Great Show

**B**ROADER in its scope than ever before, the automobile show that opens in Chicago this week marks another step in the advance of automobile development. The Chicago show has always stood for what is virile and progressive in the industry. It partakes to a greater extent than the New York shows in the breezy Western spirit, although there are many Western elements present in New York and many Eastern factors in the great Chicago exhibition. More varieties of product are displayed at Chicago in both the great lines of the industry. Thus, it is with no sense of surprise that one finds the names of very many makers of excellent automobiles in the list of Chicago exhibitors that were not present in the New York shows. On the other hand, the list includes a most representative line of cars made in the East. The Chicago show, in addition to being a great spectacle and a concrete example of the art, is also a business show. There are real sales made in the Coliseum and the Armory and real agencies established. Not that these conditions do not obtain in other shows, but they are emphatically present at Chicago.

Like almost every other great city in the country, Chicago is under the necessity of splitting its show into two sections on account of lack of an adequate building capable of housing all the exhibits. The Coliseum and First Regiment Armory are fortunately closer together than the buildings used for show purposes in almost every other city where it has been found necessary to

split the shows. This helps the situation in Chicago, but does not do away with the evil. The day will come when dividing a great annual exhibition between two buildings will be rejected as unjust to the automobile industry.

\* \* \*

## What S. A. E. Accomplished

**C**ONCERTED action on the part of a body of enthusiastic men will always produce results. When this body is made up of specialists in the lines which are to be considered at a meeting such as was held by the Society of Automobile Engineers last week, the results are very apt to be far-reaching in significance. The transactions of the Society at its last meeting show a progress which is responsible for the optimistic predictions of those connected with the organization; besides showing progress, a study of the proceedings will bring to light the fact that the debates were straight to the point. A departure from the subject under consideration was rare, while those who took part in the various discussions were those who were either familiar with the subject as a result of every-day experience or through service on some of the special committees appointed for the purpose of studying the matter. The results accomplished by the various divisions of the Standards Committee were of the highest importance and in several instances have reduced the variation of sizes of parts manufactured to a mere fraction of the former number. This part of the Society's work alone makes it a valuable asset to the industry. The papers read were noticeable because they dealt with live topics. Such matters as automatic spark control, self-starters, loading of commercial vehicles and gas engine balance are uppermost in the minds of the highest factors in the industry at the present day, and, while a discussion on papers of this nature would, in the majority of cases, resolve itself into a debate on the relative merits of the systems now in vogue, the various angles of the subject may be illuminated by the views of those interested in the development of special parts of the complete mechanism. This was shown to be the case at the winter session of the S. A. E.

\* \* \*

## Electric Lighting of Cars

**I**NFALLIBILITY, usually referred to as foolproofness, is one of the qualities sought for in an automobile equipment, and it is the great degree of this virtue residing in electric lighting equipment which accounts for the growing popularity of the lighting-generator idea. Besides cleanliness, comfort and pleasing appearance, electric illumination on automobiles has two psychological points of advantage. One consists in the great popularity enjoyed by electricity and electric devices in general since 15 or 20 years. The second reason lies in the fact that, with an electric lighting dynamo installed on his car, the automobilist is never forced to have his batteries recharged at a loss of time; nor need he ever go down in his pocket for direct payment in connection with the upkeep of the electric lighting system. The illuminating plant remains intact as long as the automobile engine is operable; in other words, as long as a lighting system is required. Dependability, thus embodied in electric lighting generators, will be responsible for the success of this type of illumination.



# No Head Yet Chosen for Contest Board

Several Candidates Mentioned, But Nothing Decided Upon

ATTENTION of motordom is directed toward the mixed conditions that now obtain with regard to the solution of the sport government situation. The status of the case is simply that the tentative contract drawn up by a committee of five from the Manufacturers' Contest Association to provide for its co-operation in a financial and moral way with the Contest Board has not been presented to A. A. A. and until it is, and has been duly acted upon by that organization, actual definite developments will not be known.

Already three or four candidates have been suggested as chairman of the Contest Board and it is understood that a conference of the board with other A. A. A. officials wished to attract a Chicago man to the job. The name of A. R. Pardington has also been suggested and in an article appearing Tuesday morning in the New York *Sun* the statement is made that Mr. Pardington is the leading candidate. This report is specifically denied by officers of the M. C. A., who state that the publication of such a report will militate against Mr. Pardington's chances if it does not kill them.

While the text of the contract is still undivulged it is understood that it calls for about the same sort of a guarantee that has been made to pay the salary of the head of the Contest Board.

The direct question was asked A. G. Batchelder, chairman of

the Executive Committee of A. A. A., as to whether he was in the field for the post. Mr. Batchelder denied the possibility.

It is not at all likely that the contract in its final form can be presented to A. A. A. within a week. But Messrs. Hollander and Hooper will probably consider it within ten days.

Mr. William Schimpf is now serving as chairman without pay.

Russell Field, assistant secretary of the Manufacturers' Contest Association, feels deeply on the subject of the flood of half-baked statements that have gained circulation with regard to the forthcoming contract between his association and the A. A. A. In referring to the matter Mr. Field said: "Twice in the last day I have sent telegrams to officers of the M. C. A. urging them to hurry action on the contract and informing them that a mass of misinformation has been given out about it. The situation is that the M. C. A. realizes that contests are not dying and that they will have to be properly governed and controlled in order to be satisfactory. The association intends to enact rules and to strengthen a governing body so that contests can be run reasonably. All the talk about candidates for the chairmanship is unjust and premature. As far as the financial arrangements are concerned, I can only say that it is the intention of the association to provide a plan founded upon a business basis so that the administration of track and road contests will not be unduly costly."

## Plans for New Arena in Railroad's Hands

Fate of Garden Hangs in Balance—Show Promoters Uneasy

PLANS for the new Arena, to be located adjacent to the new Grand Central Palace, have been finished and are now in the hands of the New York Central Railroad for ratification and acceptance. A number of changes in detail have been made in the plans since the first draft was submitted. They are as outlined in previous issues of THE AUTOMOBILE.

The date set for returning them by the railroad company is some time after February 10. A lease covering the Arena has been signed with the Automobile Board of Trade for some time, embracing its use as a show place for a term of years.

Negotiations looking to the preservation of Madison Square Garden are still in progress. Announcement has been made that a lease covering the property would probably be signed this week and coupled with the announcement is a statement from Comstock & Palmer, attorneys, that the definite ratification of the Arena plans would be held up until after the results of the negotiations are known.

A meeting of a number of the parties interested in the proposed lease of Madison Square Garden was held Tuesday afternoon at the offices of Comstock & Palmer, but nothing definite was accomplished in the way of signing the lease.

The situation as it stands is exceedingly mixed and is causing much confusion. The original understanding was that the actual construction of the Arena would commence on or before January 1, 1912, while the present status of the matter is that the plans will not be approved before February 10.

The railroad officials will not add a word of assurance that the building will be commenced even then and the physical difficulties in the way of construction are such that it is doubtful whether the new building could be made habitable by the time the next automobile show season rolls around.

Among the semi-official statements and rumors that have been industriously circulated are that the show organizations contemplating exhibiting at the Arena have been asked to wait until 1914. It has been stated that the automobile industry was represented at the conference on Tuesday, but, if this is so, it is news to those in a position to know.

In the meantime there is a strong feeling of uneasiness about the whole situation, in which everybody has something to say but nobody wishes to stand sponsor for his words.

### Fender Patents to Be Tested

Emil Grossman is the nominal defendant in a suit now on the equity calendar of the United States District Court that was brought on behalf of the owners of the Sagaar patent covering a certain kind of fender used on automobiles.

The actual defendant is the Chicago concern which manufactures the fender in question for Mr. Grossman's company. In the proceedings so far it has developed that both parties claim patents covering the product turned out. The case may be reached at any time within the next two months.



Branch house of the Cartercar Company, recently opened in Detroit, Mich.

**CARTERCAR OPENS DETROIT BRANCH**—A new branch of the Cartercar Company, recently built, has been opened at Woodward and Hendrie avenues, in Detroit. George Reason, one of the company's best men, is manager.

**STREATOR PUBLISHES FACTORY PAPER**—The Streator Motor Car Company, of Streator, Ill., is publishing a factory sheet called *The Halladay News*.

**R. P. JONES PROMOTED**—Ross P. Jones, formerly of the Ford Motor Company's Philadelphia branch, has been appointed manager of the Memphis, Tenn., branch of the company.

**WELLS LEAVES THOMAS COMPANY**—Edward Wells, now of Boston, who has been with the E. R. Thomas Motor Company for the past three years in both Buffalo and Boston, has severed his connection with the company.

**TWO NEW VELIE AGENCIES**—The Velie Chicago branch has closed agencies for the sale of Velie cars with the Moran Auto Sales Company, of Grand Rapids, Mich., and with the J. F. Charley Company, Evansville, Ind.

**PORTER TO HANDLE MAXWELL**—Nelson V. Porter has been appointed agent for the Maxwell car in Norwich, Conn., and vicinity. Mr. Porter has a large garage and salesroom at the corner of Lafayette and Oneita streets.

**NEW QUARTERS FOR WARSAW GARAGE**—G. W. Long, who has operated the Warsaw Automobile Garage, in Warsaw, N. Y., for the past ten years, is building a large, fireproof structure on Main street to be equipped as a garage and repair shop.

**COX TO DISTRIBUTE STANLEY CARS**—The J. C. Cox Company has been appointed Wisconsin distributor for the Stanley steam car. Salesroom and garage have been opened at 344-346 Sixth street, Milwaukee, Wis. W. W. Burgett is in charge as sales manager.

**S. J. WISE & COMPANY'S NEW BOSTON BRANCH**—The new Boston salesroom of S. J. Wise & Company, of New York, has

been opened at Boylston and Fairfield streets. The company handles the Valveless Amplex car in the East. A fully equipped service department will be maintained.

**YONKERS CLUB OPENS CLUBHOUSE**—The handsome new clubhouse of the Yonkers, N. Y., Automobile Club has been formally opened. The following officers were installed: J. J. Walsh, president; R. H. Jackson, vice-president; Dr. A. N. Benedict, treasurer; E. N. Cokefair, recording secretary, and G. B. Foster, financial secretary.

**BRUCE NOW TREASURER OF STREATOR MOTOR CAR COMPANY**—C. Arthur Bruce, formerly treasurer of the A. O. Smith Company, of Milwaukee, Wis., has come to Streator to become treasurer of the Streator Motor Car Company. He succeeds A. L. Goetzmann. Mr. Bruce assumed his duties the first of the year and is a very capable man for the position.

**WALTER ORGANIZES STAVER MOTOR CAR COMPANY**—The Staver Motor Car Company of Milwaukee has been organized by Henry Walter, and has established headquarters in the former Kissel Garage at 228-232 Wisconsin street. Mr. Walter, who is president and general manager, formerly was owner of the Walter Automobile Company, of Appleton, Wis.

**BRUSH AND DETROITER HAVE NEW AGENT**—The T. G. Northwall Company, of Omaha, Neb., recently contracted with the following for the Brush and Detroider cars in that territory: Ralph C. Scott, Beatrice, Neb.; Smalling & West, Nebraska City; P. M. Anderson, Filley, Neb.; P. J. Schaeff, Julian, Neb.; J. C. Cleveland, Storm Lake, Ia., and August Gorden, Plattsmouth, Neb.

**READING PARTNERSHIP DISSOLVED**—The partnership heretofore existing between E. S. Youse, of Reading, Pa., and S. H. Daddow, of St. Clair, Pa., under the name of Youse & Daddow, has been dissolved by mutual consent. Mr. Youse has taken over Mr. Daddow's interest in the firm, and becomes sole owner. The business will be continued under the name of E. S. Youse Company.



**LEWIS COMPANY TO HANDLE MIDLAND**—The Lewis Sales Company, of this city, has been appointed agent for the Midland cars.

**COLE AGENCY AT WACO, MINN.**—Byron & Cunningham, 109 East Elm street, have contracted for the Cole agency in this territory.

**C. F. DRESCHLER TAKES ON FRANKLIN**—Charles F. Dreschler has secured the contract for the present season to sell Franklin automobiles in this territory.

**VALENTINE OPENS TWO BRANCHES**—The John H. Valentine Company, distributor for the Hanna self-starter, has opened branches in Detroit and Buffalo.

**BUICK TRUCKS ADDED TO LINE**—J. O. Bradeen, Syracuse agent for the Buick Company, has contracted to handle Buick motor trucks, in addition to the pleasure cars.

**SHARP SPARK PLUG BOOSTS CAPITAL**—The Sharp Spark Plug Company has increased its capital stock from \$10,000 to \$20,000. James E. Loyd is president and Edward J. Loyd is secretary.

**SCHACHT AGENCY AT SYRACUSE**—John D. Quinlan has taken the Syracuse agency for the cars of the Schacht Motor Car Company, of Cleveland, Ohio, and will open salesrooms here.

**SIMPLEX PLACES SYRACUSE AGENCY**—W. Snowden Smith, Jr., has taken the agency for the Simplex car and his territory includes the counties of Onondaga, Cortland, Madison and Oswego.

**STODDARD AGENTS AT ROCHESTER CHANGED**—A. M. Zimbrich, of Rochester, N. Y., has appointed W. H. Downey, of that city, to succeed W. S. Horton as manager of the Stoddard-Dayton garage in this city.

**DART HAS NORTHWESTERN AGENCY**—The La Crosse Implement Company has been made Northwestern distributor of the Dart light delivery vehicles and heavy trucks. J. F. Cross is sales and advertising manager.

**NEW BRANCH FOR SCRANTON, PA.**—A branch store has been opened by the Susquehanna Motor Car Company on Adams avenue. This company has the agency for the Cadillac car for Luzerne, Lackawanna, Wyoming and Columbia counties.

**REYNOLDS CHICAGO MANAGER FOR CHASE**—The Chase Motor Truck company has appointed Charles E. Reynolds, of this city, district manager, his territory covering Chicago and certain portions of the Middle West. His headquarters will be in Chicago.

**S. K. F. COMPANY OPENS IN CHICAGO**—The S. K. F. Ball Bearing Company, 50 Church street, New York, has opened an office in this city to facilitate the handling of Western business. The new office will be in 1505 Heisen building, and in charge of Mr. C. A. Winn.

**MARYLAND AGENCY FOR HAYNES**—The Haynes car is now being handled in Baltimore and the State of Maryland by the Haynes Sales Company, of which T. C. Sims is manager. Mr. Sims has his headquarters with the Lozier Sales Company, North and Maryland avenues.

**BOICE-PERRINE COMPANY FORMED**—W. S. Boice and L. Perrine, the latter formerly of New York, have formed a partnership as the Boice-Perrine Company, and have opened a place at 601 Boylston street, Boston, Mass., where they are handling the Vesta battery products for New England.

**WHEELER LEAVES FRANKLIN**—Arthur Wheeler has resigned as assistant sales manager of the Franklin Automobile Company and will act as salesman for T. A. Young, agent for the Peerless and R. C. H. cars. W. S. Curtiss, formerly connected with the James Auto Company, has taken the agency of the R. C. H. car for Cayuga County.

**CARTER COMPANY NAMES AGENTS**—The Carter Company, of Omaha, has recently granted several new contracts for handling Carter cars in Iowa and Nebraska. F. P. Hoye will handle the car in the western part of Custer County and in Logan County. The Exeter Garage & Machine Company, of Exeter,

Thomas Spatts, of Osmond, and the Logan Valley Carter Car Company, of Oakland, are other new agents.

**HOOSIER TRADE BODY REORGANIZED**—The Indianapolis Automobile Trade Association has reorganized for this year by electing the following officers: President, Harry L. Archey, of the Archey-Atkins Company; vice-president, Frank Staley, agent for the R. C. H.; secretary, F. Ellis Hunter, of the Fischer-Gibson Company, and treasurer, Frank L. Moore, of the Archey-Atkins Company. The association contemplates a motor car show in March.

**F. H. SMITH MOVED TO DETROIT**—Frank Smith, who has been manager of the Minneapolis branch of the Studebaker corporation for some time, has been appointed assistant sales manager of the E-M-F factories of the corporation at Detroit. He will be succeeded in Minneapolis by C. R. Newby, formerly manager of the E-M-F branch at Sioux Falls, S. D. C. E. Stebbins, head of the order department in Detroit, is transferred to the Sioux Falls branch. H. W. Miller takes Mr. Stebbins' place here.

**CHANGE IN WOODS STAFF**—Several changes among prominent officials are reported by the Woods Motor Vehicle Company, makers of Woods electrics. F. J. Newman, chief engineer, has resigned and has been succeeded by R. S. Fend, who has been on the Woods staff for some time and who formerly was with the Columbus Buggy Company. Mr. Newman has not announced his plans for the future. Carl J. Metzger, sales manager for several years, and who has just returned from a trip to Europe with the Society of Automobile Engineers, also has handed in his resignation, which was accompanied by that of his assistant, Roy Herrington. Mr. Metzger's successor has not been named as yet.



Five-ton Sampson truck used by Mosler Safe Company

**HESS-BRIGHT OMAHA AGENCY**—The Powell Supply Company will handle the Hess-Bright ball bearings in this territory.

**COLE ADDED TO KIMMEL LINE**—Kimmel Brothers, at 215 North Fourth street, have taken the agency for the Cole, in addition to the Speedwell.

**LIVERPOOL, O., HAS FORD AGENCY**—The Ford Auto Agency has taken the agency for the Ford in that county. The salesrooms are located at 126 West Fourth street.

**VELIE AGENCIES IN BAY STATE**—The Shean Auto Station, of this city, through its manager, E. J. Lane, has closed for the Velie agency for Springfield and the surrounding towns.

**CADILLAC COLORADO AGENCY PLACED**—Bert Hall, manager of the local Cadillac branch, has appointed the Weld County Auto Company, of Greeley, Cadillac agent for Weld County, Col.

**DETROITER HAS OMAHA HOME**—The T. G. Northwall Company has contracted with the new Briggs-Detroit Company to handle the cars manufactured by that concern in this territory.

**MOORE OIL COMPANY IN LOUISVILLE**—The Charles H. Moore Company, of Cincinnati, O., has established a branch in this city at Brook street and Broadway. L. W. Thompson has been selected to manage the Louisville office.

**LEIGHTON & HANCOCK TAKES ON STERNBERG**—The Leighton & Hancock Motor Truck Company is the name of a new concern organized at 16 East Walnut street to handle the Sternberg trucks and operate a garage and repair shop.

**MIDLAND NAMES DENVER AGENCY**—W. A. Peck, traveling representative of the Midland Motor Car Company, of Moline, Ill., has appointed the Alkire Motor Car Company, of 1650 Glenarm place, local agent for the Midland car.

**NEW FORD AGENCY IN WISCONSIN**—Frederick J. Rogers, of Nashville, Wis., has leased the Bank warehouse for garage and salesrooms and will make Crandon a distributing point for Ford cars. Leslie J. Carter will be local manager.

**STUCKER TO HANDLE VELIE**—C. M. Stucker has been appointed manager of the automobile department of the Deere & Webber Company, which controls the distribution of all products of the Velie Motor Vehicle Company, of Moline, Ill. He succeeds W. J. Geer, resigned.

**CHANGES IN LOZIER BOSTON BRANCH**—J. J. Gormley has resigned as manager of the Boston branch of the Lozier Motor Company because of ill health and is going to look after the

retail sales in this territory. R. B. Nettleton has been appointed manager of the branch.

**VELIE AGENCY AT ST. STEPHEN**—H. C. Purves has closed for the agency of the Velie pleasure and commercial cars for the Province of New Brunswick. Purves has established a service station in St. Stephen, N. B., and in Calais, Me., which will be the United States headquarters.

**MINNESOTA FARMERS OWN CARS**—State Secretary Julius Schmahl says that between 15 and 20 per cent. of the automobiles owned in Minnesota belong to farmers. Although 19,200 machines were licensed in 1911, the secretary believes there are 20,000 in the state. He figures the investment at \$20,000,000. In 1910 there were 12,000 registrations and 30,000 are expected in 1912.

## Automobile Incorporations

### AUTOMOBILES AND PARTS

**AUSTIN, TEX.**—Capital City Auto Company; capital, \$35,000; to sell and repair automobiles. Incorporators: Pierre Bremond, W. M. Graham, H. J. Grinnan, R. M. Thomson, Jr.

**BALTIMORE, MD.**—J. S. Ditch & Co.; capital, \$20,000; to deal in automobiles, etc. Incorporator: J. S. Ditch.

**BICKNELL, IND.**—Bicknell Auto Company; capital, \$15,000; to deal in automobiles. Incorporators: E. T. Hollingsworth, S. S. Hollingsworth, J. E. Keith, H. A. Murray, J. Carrico, R. McClure, W. V. Gates.

**BROOKLYN, N. Y.**—Randolph Motor Truck Company; capital, \$200,000; to manufacture and sell motor trucks and vehicles of all kinds.

**CAMDEN, N. J.**—Bergdoll Sales Company; capital, \$10,000; to deal in automobiles.

**CAMDEN, N. J.**—Rowe Motor Company; capital, \$500,000; to manufacture and deal in automobiles, carriages, cars, etc. Incorporators: C. D. Besore, M. Lambert, F. M. Caskill.

**DALLAS, TEX.**—Henderson-Cole Motor Company; capital, \$10,000; to deal in automobiles. Incorporators: W. F. Bridewell, F. T. Bridewell, C. F. Hurst.

**DETROIT, MICH.**—Krit Motor Car Company; capital increased from \$250,000 to \$500,000.

**JERSEY CITY, N. J.**—Webb-Veitch Company; capital, \$25,000; to manufacture automobiles, motorcycles, aeroplanes, etc. Incorporators: C. N. King, Jr., G. H. Russell, E. H. Geran.

**LEXINGTON, KY.**—Fayette Motor Company; capital, \$10,000; to engage in the automobile business. Incorporators: C. B. Mathias, M. Smedley, W. P. Price.

**MILWAUKEE, WIS.**—Hydraulic Motor Vehicle Company; capital, \$15,000; to manufacture and sell automobiles and motor vehicles. Incorporators: C. Stewart, A. Baltzer, W. M. Stewart, W. E. Brown.

**NEW YORK CITY.**—De Lamater-Byrnes Automobile Company; capital, \$30,000; to manufacture and deal in automobiles and motor vehicles. Incorporators: J. W. De Lamater, M. B. Byrnes, W. A. Shepard.

**PLAQUEMINE, LA.**—Plaquemine Motor Car Company; capital, \$10,000; to engage in the automobile business. Incorporators: W. A. Holloway, E. B. Schwing.

**RICHMOND, VA.**—Oakland Auto Company; capital, \$4,000 to \$15,000; to conduct an automobile business. Incorporators: R. H. Bruce, S. V. Gregory, G. T. Sharp.

**WASHINGTON, D. C.**—Bowles Motor Sales Company; capital, \$25,000; to deal in automobiles and motor vehicles. Incorporators: N. S. Bowles, I. C. Barber, C. Kleppmeyer, G. W. Bready.

**NEW YORK CITY.**—A. Hazen-Green Company, Inc.; capital, \$5,000; to deal in automobiles. Incorporators: A. H. Green, J. H. Cunningham, C. L. Green.

**WATERTOWN, N. Y.**—Edwards Auto Company, Inc.; capital, \$7,000; to engage in the automobile business. Incorporators: F. H. Edwards, R. E. Edwards, R. C. Brimmer.

### GARAGES AND ACCESSORIES

**ATLANTA, GA.**—Interstate Tire & Rubber Company; capital, \$500,000; to manufacture and deal in automobile tires and inner tubes.

**BOONTON, N. J.**—Boonton Transportation & Garage Company; capital, \$125,000; to operate an automobile garage. Incorporators: F. E. Morse, L. B. Morse, R. Dawson.

**BROOKLYN, N. Y.**—Mohawk Garage Company; capital, \$50,000; to conduct an automobile garage. Incorporators: B. J. Roesler, Jr., A. M. Roesler, W. Roesler.

**BROOKLYN, N. Y.**—Prospect Stable & Garage Company; capital, \$10,000; to conduct a stable and automobile garage. Incorporators: D. P. Healy, Sr., D. P. Healy, Jr., M. Healy.

**CHICAGO, ILL.**—American Auto Supply Company; capital, \$2,500; general mercantile and trading business. Incorporators: B. Payne, W. B. Keefe, W. R. Peacock.

**CHICAGO, ILL.**—Union Club Motor Livery; capital, \$1,000; to engage in a general livery and motor business. Incorporators: A. L. Myers, E. A. Zimmerman, E. L. Wellner.

**INDIANAPOLIS, IND.**—Wilcox-Hoyt Manufacturing Company; capital, \$10,000; to manufacture electric devices for automobiles. Incorporators: R. A. Wilcox, H. E. Wilcox, F. R. Hoyt.

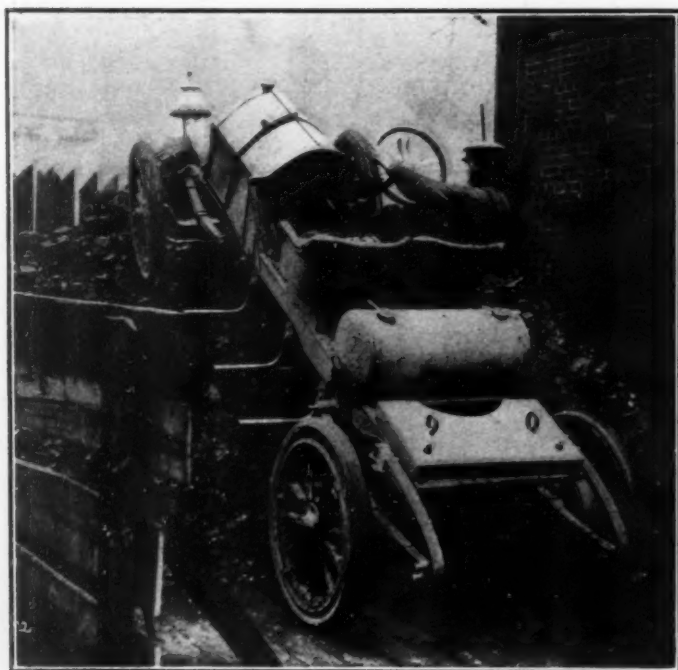
**NEW YORK CITY.**—Amerital Manufacturing Company; capital, \$200,000; to manufacture automobile wheels and tires. Incorporators: W. O. Turrell, S. Scognamiglio, L. W. Schwartz.

**NEW YORK CITY.**—Berg Auto Truck & Specialty Company; capital, \$30,000; to manufacture and deal in automobile supplies. Incorporators: J. Berg, J. Baehr, G. Seyman.

**NEW YORK CITY.**—Folberth, Inc.; capital, \$10,000; to deal in automobile supplies. Incorporators: C. H. Bruce, W. A. White, J. C. Jackson.

**NEW YORK CITY.**—Shawmut Tire Company of New York, Inc.; capital, \$5,000; to engage in the automobile tire business. Incorporators: C. C. Marston, W. G. Page, A. S. Campbell.

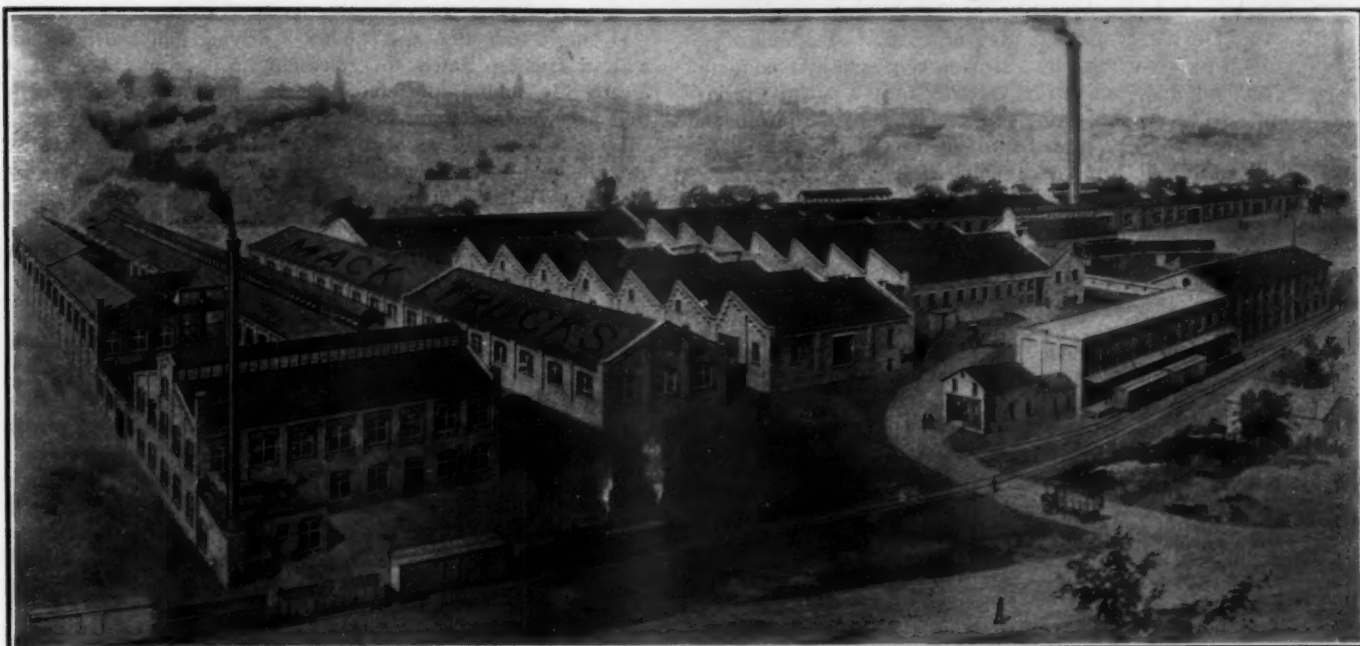
**NEW YORK CITY.**—Thomas Auto Service Company; capital, \$10,000; to engage in the automobile business. Incorporators: A. M. Moses, M. M. Sloss, B. Goldfinger.



Coal is high, but the Cole testers can mount it



# OF INTEREST *to the* INDUSTRY



Mack shops of the International Motor Company at Allentown, Pa.

**MACK SHOPS OF INTERNATIONAL MOTOR COMPANY**—The Mack shops of the International Motor Company, at Allentown, Pa., occupy a site of 22 acres on the line of the Central Railroad of New Jersey and the Lehigh Valley. The manufacturing is being conducted in nine separate brick buildings of mill-type design. The main buildings, such as the machine shops, assembly and painting departments have saw-tooth roofs with prism glass and the ventilation and lighting are in accordance with the latest practice in industrial plant architecture. The offices are located in a separate two-story administration building. The shop force numbers 640 men, and the capacity of the plant with this force averages ninety trucks a month.

**TRUCK COMPANY FOR RED WING, MINN.**—The Waldorf Auto Motor Truck Company, of Minneapolis, Minn., will locate here.

**AMERICAN MOTOR COMPANY BRANCH AT LIMA, O.**—Lima has secured an automobile factory. The plant is a branch of the American Motor Company, of Brockton, Mass., and will manufacture the Lima roadster. Lima subscribes \$25,000 worth of stock to secure the factory.

**CROXTON COMPANY MAY MOVE**—Arrangements have been practically closed for the location of the Croxton Motor Company, of Cleveland, O., in Washington, Pa. This company was formerly the Croxton-Keaton Company, of Massillon, O., and is the pioneer taxicab manufacturer in this country.

**STROMBERG BUYS FACTORY BUILDING**—The Stromberg Motor Devices Company, of Chicago, has purchased the new seven-story factory building of concrete-steel construction on Twenty-fifth street 139 feet west of Michigan avenue, which it has been occupying the last year under lease from Robert M. Fair, together with a lot 61 by 101 feet. The consideration given is nominal.

**AUTOMOBILE FACTORY FOR MEXICO**—Jean Giraud, of Paris, has been investigating the automobile situation in Mexico as the representative of a syndicate of French people who contemplate establishing a large factory at some point in that country for the manufacture of automobiles. It is stated that not less than

\$1,000,000 gold will be invested in the enterprise if Mr. Giraud's report is favorable.

**OSHKOSH COMPANY BUYS KNIPPENBERG MANUFACTURING COMPANY**—The Oshkosh Metal Products Company has purchased the Knippenberg Manufacturing Company of Oshkosh, Wis., together with its equipment, tools, machinery, etc. The company manufactures carbide lamps and other specialties and will now extend its product. C. H. Hartley is president and Fred A. Morse is general manager.

**DAVIS MANUFACTURING COMPANY TO INCREASE PLANT**—The Davis Manufacturing Company, Fifteenth avenue and Park street, Milwaukee, Wis., manufacturing motors and engines for pleasure and commercial cars, will build a \$35,000 addition to its plant in the spring. The present plant is only a little more than three years old, but has been doubled in size twice. The latest addition will have dimensions of 52 by 186 feet, two stories high, and will be of brick and steel construction.

**POLAND ORGANIZES SELF-STARTER COMPANY**—W. R. Poland, for a number of years identified with the Remy Electric Company, of Anderson, Ind., has resigned his position as general manager of that company to take active charge of a company which he has organized for the purpose of manufacturing and marketing a mechanical self-starter for automobiles. The company will be known as the Simplex Manufacturing Company and will locate in Anderson, Ind. The product will be styled the Simplex Self-Starter.

**HAYWOOD TIRE & EQUIPMENT COMPANY BUYS MOTOR APPLIANCE COMPANY**—The Motor Appliance Company has been purchased by the Haywood Tire & Equipment Company and hereafter the M. A. C. steam vulcanizers will be manufactured at the Marble-Haywood plants. This consolidation gives the Haywood Tire & Equipment Company a very complete line, with plants for the motor-car owner and for the largest garage and independent tire shop. The entire manufacturing equipment and selling force of the Motor Appliance Company have been moved to the factory of the Haywood Tire & Equipment Company, 530-532 North Capitol avenue, Indianapolis, Ind.

# PATENTS GONE TO ISSUE

**P**ISTON—A design of varying diameter.

3. The patent protects the construction of a hollow piston, Fig. 1, encircled by a spacing ring held by a confining ring. Confining and spacing ring together form a packing-receiving groove. The confining ring is threaded onto the piston and held in place by a key thread into the same. The key has a head received in a hole of the confining ring.

No. 1,014,782—to Martin V. Smith, Hartford, Conn. Granted January 16, 1912; filed March 4, 1911.

**ROLLER BEARING**—Having double rollers tapered in opposite directions.

5. The roller bearing, Fig. 2, comprises oppositely tapered rollers arranged in pairs upon a common axis with their smaller ends approaching and their larger ends remote from one another. They are independently movable in a longitudinal direction, as they roll against traction rings having conical faces. Guide rings which are connected together and engage the outer ends of the rollers take up their outward thrust.

No. 1,015,273—to William J. Cartwright, New York City. Granted January 16, 1912; filed February 6, 1909.

**AUTOMOBILE BUFFER**—A construction containing cushioning devices to take up shock.

3. The buffer referred to in this patent, Fig. 3, is a combination of a buffer bar with cushioning devices carrying the same, it being pivoted on the hinge-bolts of the elliptic springs of the vehicle and extending rearwardly thereof. The rear ends of the cushioning devices are connected to the front portion of the vehicle by means of suitable links. The latter comprise vertical rods having horizontally bent lower end portions which are threaded to adjustably engage internally threaded holes in the rear ends of the cushioning devices mentioned in the above description.

No. 1,014,713—to Allan McGregor, Duluth, Minn. Granted January 16, 1912; filed August 27, 1909.

**CLUTCH**—Which automatically tends to disengage.

4. This clutch, Fig. 4, combines a driving and a driven shaft with a friction clutch for releasably connecting these shafts. Means for holding the clutch in engagement are provided, as well as means whereby the engagement automatically tends to effect a release independently of the holding means; there are also yielding means separate from the holding means for opposing the release and adapted to overcome the holding means at a predetermined load.

No. 1,014,826—to Morris B. Ireland, New York City. Granted January 16, 1912; filed January 22, 1909.

**LUBRICATING DEVICE**—Consisting of a tumbling chamber moved by the engine piston.

2. This patent covers the combination with the cylinder and piston of an engine, of a tumbling chamber and loose, movable particles of non-fluid oil lubricant therein. The chamber is capable of being tumbled about by the movement of the engine piston; it has walls adapted to induce tumbling motions in the particles of the lubricant contained in it.

No. 1,014,744—to Charles S. Bavier, New York City. Granted January 16, 1912; filed March 1, 1911.

**CLUTCH MECHANISM**—In which one member is a rotary sleeve with an inequality engaging a cylindrical section having an inequality adapted to mate with the one above mentioned.

4. In this clutch, a solid shaft, of substantially equal strength throughout its length and having a cylindrical section and a substantially square section, is combined with a sleeve which is mounted rotatably on the cylindrical section and which has a clutch member formed integrally thereon. Around the shaft is coiled a spring which bears against the slide to engage the members. Means are provided for holding them out of engagement.

No. 1,012,819—to Herbert Cooper, Brooklyn, N. Y. Granted December 26, 1911; filed December 31, 1910.

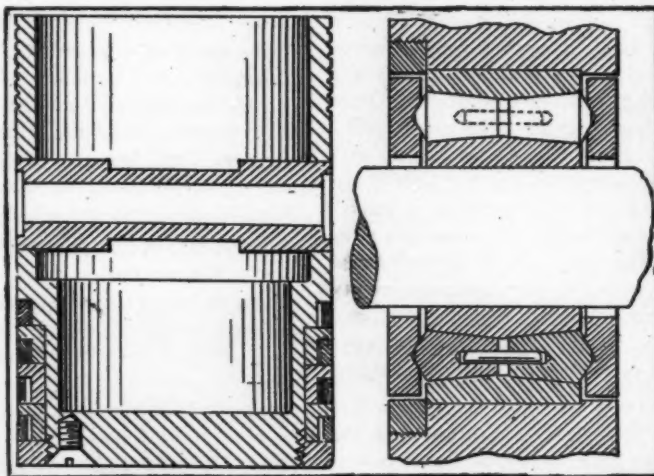


Fig. 1—Smith piston

Fig. 2—Cartwright roller bearing

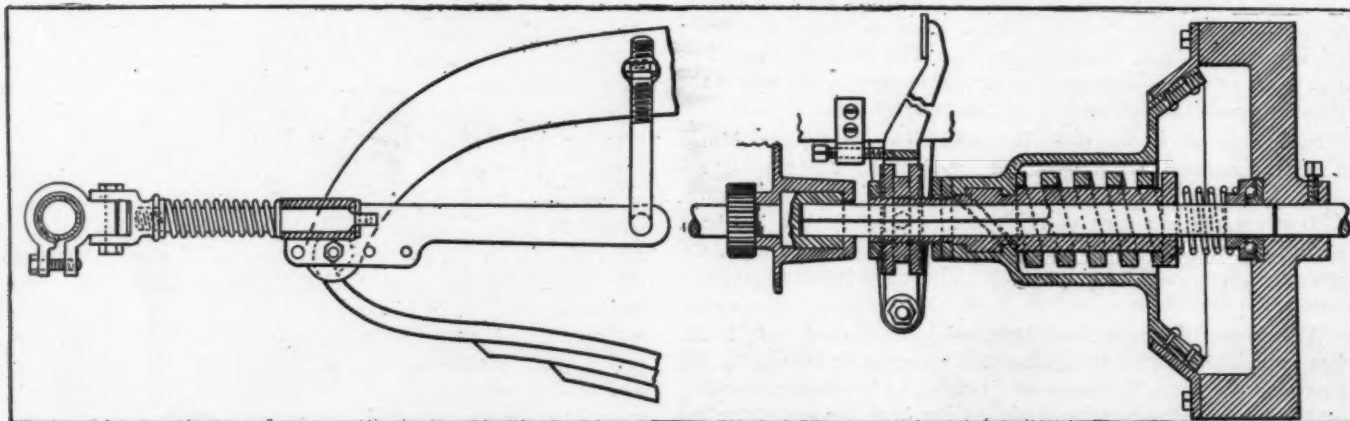


Fig. 3—The McGregor automobile buffer

Fig. 4—The Ireland clutch